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(C.P.S.P.S.)



**PROTECTION AND REMEDIATION OF RIVERS
AND RIVER LANDSCAPES IN THE
REPUBLIC OF LEBANON
VOLUME ONE (REPORT)**

Prepared by

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On behalf of

**TRANSTEC/FICHTNER CONSORTIUM
SECTOR IMPLEMENTATION UNIT # 3**

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FICHTNER

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0. Executive Summary

Lebanese rivers and their surrounding areas are in part extremely polluted. Some of the rivers and river landscapes have already been disturbed for ever by human activities.

Not only urban waste water effluents pollute the rivers themselves; also the river banks and the surrounding areas are often polluted or disturbed.

Since there is no treatment of liquid effluents from industry or of sewage from settlements in most areas of the Lebanon, the majority of these effluents are discharged or used for irrigation. Due to this practice, large areas of the Lebanese water bodies and also some of the plants irrigated with this water are polluted. From both there is a high risk for the Lebanese population.

Upon arrival of the consultant, various possibilities for the final Terms of Reference were discussed with the MoE, CDR and SIU #3. In light of Fichtner's experience with similar projects in different countries around the world changes to the existing ToR were proposed and discussed with the MoE and SIU #3. H. E. the Minister of Environment and his Advisers agreed to those changes in a meeting held on March 13th 98.

With the aim of changing this situation in future, the Ministry of the Environment together with the Sector Implementation Unit (SIU#3) have agreed on the following objectives:

- Preparation of guidelines for the management of Lebanese rivers (Volume One)
- Preparation of Terms of Reference for an engineering program for the implementation of these guidelines and for an in-depth program for the remediation of Lake Karaoun and the upstream Litani River. (Volume Two)

Due to a new project financed by Sweden for the management of Lake Karaoun, it was agreed in another meeting to include Nahr Ibrahim instead of Lake Karaoun in the Terms of Reference.

This staged program prepared by Fichtner will enable all facets of river protection to be prepared and approved.

During a site evaluation the consultant familiarized himself with the general situation of Lebanese rivers.

During this site visit it was found at all visited rivers that the environment in the surrounding areas is seriously disturbed by human activities.

Discharge of waste water from industry and settlements, houses and factories on river banks, waste disposal, stone quarries and agricultural used land close to the rivers are some of the main reasons.

Pictures from some of the hot spots at Nahr Ibrahim, Nahr el Kalb, upper Litani and Lake Karaoun can be found in chapter 3 of this report.

The evaluation of existing laws and standards and discussions with various authorities and NGOs shows that:

- The institutional responsibilities for river protection and management overlap between national, regional and local authorities,
- There is an institutional deficiency in river management,
- There is a lack of national and regional land use plans,
- Many different sector-specific, national plans have already been developed but are not guided by any national or regional plan.
- Except for the MoE Decision No. 52/1 dated 1996 no other regulations, decrees or laws exist for the protection and remediation of rivers.
- No guidelines are available concerning urban waste treatment.

These facts allow the following conclusion to be drawn with regard to existing laws and regulations:

There are presently no laws or regulations concerning the protection and remediation of rivers in the Republic of Lebanon. Since river protection cannot be focused exclusively on water quality - although this is one of the most urgent issues - general regulations covering all aspects of river protection should be prepared.

During this mission guidelines as a basis for regulations have been prepared for the protection and remediation of the Lebanese rivers and river landscapes.

The first guideline with the title

“Guideline for the protection and remediation of rivers and river landscapes in the Republic of Lebanon”

forms the basis for all future activities.

In the second guideline, entitled

“Guideline concerning urban waste water treatment in the Republic of Lebanon”

together with the MoE Decision No. 52/1 guidelines concerning urban waste water treatment have been developed on the basis of the EC Council Directive of May 21st, 1991 (91/271/EEC).

Based on the above guidelines and on the findings of the site visits, various discussions and investigations Terms of Reference for:

“Consultancy services for river protection and remediation in Lebanon-remediation of the Nahr Ibrahim and upper Litani River area”

have been prepared.

This Term of Reference cover, starting from the existing situation, all aspects of river protection and remediation, and can be approved and implemented over two stages within 14 month.

The following scope of services is included in the Terms of Reference:

Phase 1 :

- baseline survey of the project area and its rivers
- elaboration of a river pollution map with river characterization concerning flow and quality
- implementation of an inventory of landuse and computerized waste water discharge register
- elaboration of a staged program for river protection and remediation

Phase 2 :

- development of an in-depth engineering and training program for the remediation and protection of selected areas (Nahr Ibrahim and upper Litani River)
- detail site evaluation and investigation of the selected area
- determination and execution of individual remediation subprojects including:
 - feasibility design
 - preparation and evaluation of tender documents
 - assistance during contract negotiations
 - assistance and training of MoE’s personnel.

Also included in the Terms of Reference is a form of agreement with articles and conditions of the agreement for the provision of consulting engineering services and other general information.

1. Background and Objectives

Human activities are degrading the environment and the quality of life in rivers and river valleys all over Lebanon. The rivers and their surrounding areas are in part extremely polluted. Some of the rivers and river landscapes have already been disturbed for ever by human activities.

Not only the rivers themselves are polluted by urban waste water effluents from industry and settlements; the river banks and the surrounding areas are often polluted or disturbed by waste disposal, stone quarries, buildings and extensive agriculture.

Since, at the present time, there is no treatment of liquid effluents from industry or of sewage from settlements in most areas of Lebanon, the majority of these effluents are either discharged into surface waters, coastal waters, the subsoil or used for irrigation.

Due to this practice, large areas of Lebanon's water bodies are polluted.

With the aim of changing this situation in future, the Office of H.E. Minister of the Environment, Mr. Akram Chehayeb, and the Sector Implementation Unit (SIU# 3) have agreed on Terms of Reference for a project for the:

Preparation of Guidelines for the Management of Lebanese Rivers and for the preparation of Terms of Reference for a program for the implementation of these Guidelines as well as for a program to environmentally remediate Lake Karaoun and the contributory upper Litani River in the Bekaa Valley.

The objectives of this project are:

1. To formulate general guidelines for the management of Lebanese rivers. These guidelines are to be used as basis for a governmental decree to environmentally remediate and manage the Lebanese rivers
2. To prepare Terms of Reference for an engineering program for the implementation of these guidelines for Lebanese rivers and the implementation of a river classification as well as a computerized waste water discharge register
3. To prepare Terms of Reference for an in-depth engineering program which should result in recommendations and projects for the remediation of Lake Karaoun and the upstream Litani river as a case for the environmentally remediation of one of the most polluted areas of Lebanon

This three-stage program will enable all facets of river protection to be prepared and approved.

Due to a new project, which is funded by Sweden, the Lake Karaoun will not longer form part of this project. As agreed with the MoE, the Nahr Ibrahim river valley shall be investigated instead of the Lake Karaoun. Case studies for a typical area with settlements, industry and agriculture (upper Litani) and for a more rural area (Nahr Ibrahim) should be prepared to indicate possible solutions for t-he remediation of other Lebanese rivers.

2. Development of a River Protection and Remediation Program

The Consultant from Fichtner on behalf of the Transtec/Fichtner Consortium for SIU#3 arrived in Beirut on March 9th, 1998 and immediately started work. First of all, various possibilities for the "Protection and Remediation of Rivers and River Landscapes in the Republic of the Lebanon" were discussed with the MoE, CDR and SIU#3.

In the light of Fichtner's experience with similar projects in different countries around the world, especially in Eastern Europe, a few changes to the existing Terms of Reference were discussed and finally agreed upon at a meeting, held on March 13th, 1998 with H.E. Minister of the Environment, Mr Akram Chehayeb, and his advisors, Dr. Talal Chartouni and Mr. Zahi Abou Mansour. These Terms of Reference are attached in **Annex 1** of this volume.

As explained in chapter 1 of this report, the Nahr Ibrahim river valley shall be investigated instead of the Lake of Karaoun Basins.

The advantages of this program are that all aspects of river protection and remediation can be implemented and approved over three stages within a given time frame. These stages are:

1. The existing guidelines have to be supplemented by guidelines covering general aspects of river protection.
2. These guidelines will be implemented in the second phase. This shall be seen as a Masterplan during which in a first step the consultant has to define sampling points, the method of sampling, and quantities and parameters which have to be analysed. Also the existing maps have to be improved and updated by the consultant. During this phase, the quality and flow of the main Lebanese rivers (around twenty) will be measured and evaluated according to the sampling and analysis procedures defined by the Consultant and a river pollution map with a classification of pollution established according to standardized methods for classifying river water qualities. A table which shows possible classification criteria can be found in Annex 5. In addition, the main elements that constitute a river landscape will be analyzed and classified, an inventory of land use will be prepared and a computerized waste water register of all relevant waste water discharges will be set up.

MoE's personnel will be trained and during this training period, the collection and evaluation of data will form an integral part for the work.

A phased program for the protection and remediation of Lebanese rivers will be developed, the costs for short, medium and long-term scenarios will be estimated and MoE personnel will be assisted and trained in drawing up a program for all aspects of River Protection and Remediation. In order to do this a series of specialized and intensive training courses will be included in Phase 2.

3. As case studies for typical Lebanese rivers landscapes an in-depth engineering program for two selected areas (Nahr Ibrahim as a rural area and the Upper Litani River as an area with settlements, Industry and agriculture) will be developed on the

basis of the guidelines and the work accomplished in stage 2. This engineering program will lead to recommendations and projects for the remediation of Nahr Ibrahim and the upper Litani River. During stage 3, a detailed site evaluation of the project area together with the catchment area must be carried out and the program, formulated in 2, must be approved. The individual remediation projects, including cost estimates, ecological and economic feasibility, preparation and evaluation of tender documents have to be handled. In addition to these remediation projects, further necessary projects for implementation by the dischargers in industry and the communities have to be formulated and the dischargers assisted with regard to process selection. MoE personnel will be assisted and trained in the formulation of regulations/decrees, in the approval of permitting documents and in the formulation of licenses for discharging waste water as well as for constructing and operating waste water treatment plants.

This program will ensure that guidelines can be developed, together with additional measurements and investigations implemented in a river management master plan and approved for the remediation of one of two typical areas in the Lebanon.

3. Site Evaluation

The Consultant visited several rivers in Lebanon to familiarize himself with the general situation of Lebanese rivers.

It was found at all visited rivers (Nahr El Kalb, Nahr Ibrahim, Nahr Antelias, Nahr Beirut and The Litani River) and at Lake Karaoun that the environment in the surrounding areas is seriously disturbed by human activities: The major environment disturbances can be summarized as follow

- Settlements and industry discharge their waste water and sewage into the rivers without any form of treatment,
- Houses and factories can be found close to the banks of all the visited rivers without any consideration for the landscape and nature conservation,
- Illegal waste disposal and dumping sites can be found along all the rivers (leachate from these wastes will seep into the groundwater and rivers, resulting in both organic and inorganic contamination),
- The water in all the rivers is used for irrigation. Consuming plants, fruits and crops that are irrigated with polluted water, results in a high health risk for the population,
- Stone quarries in some cases disturb the landscape irreversibly. Most of the quarries are in areas that should be conserved for the future,
- Agricultural areas can be found very close to the river banks. Due to the intensive use of fertilizers and pesticides, the run-off of polluted drainage from these areas into the rivers is considered a severe pollution problem.

The situation at the visited rivers is in some cases dramatic. Without immediate action, pollution will increase to levels that are likely to disturb the rivers and their

surrounding areas to such an extent that remediation will either no longer be possible, or only at such an exorbitant cost that rehabilitation will be too expensive.

In addition, the environmentally sensitive valleys of Nahr el Kalb and Nahr Ibrahim are in part seriously affected by human activities. Without action in the near future, these valleys - which also form part of the recreational areas of Beirut's population - will be disturbed to an irreversible extent.

Due to heavy rainfall during the period of the site visits, detailed inspections were not possible. It will be easier to investigate and evaluate the influence of waste water discharges during the dry season when water levels are lower.

This evaluation and site investigation should form an integral part of the second stage, along with monitoring the dischargers, and should be carried out as soon as possible.

3.1 Visit to the Nahr Ibrahim.

The valley of the Nahr Ibrahim is a steeply inclined valley with a great variety of plants and flowers, which also forms the basis for the remarkable fauna biodiversity of the valley with insects, spiders, amphibians, reptiles, mammals and birds.

The spectacular landscape offers a dramatic view from the recently restored Roman bridge close to the highway to the mountain canyons further inland. The villages of Adanis and Yahchouch have kept their endemic character, blending into the landscape. However, this biologically rich and beautiful valley is being exploited as a result of various human activities.

The following photographs show some of the hot spots which were found during the site visit.

4. Evaluation and Discussion of Existing Laws and Regulations

The evaluation of the existing laws and standards which was carried out during the visit to Beirut and discussed with various authorities and NGOs (MoE, MHER, MPW, SIU#1, SIU#3, UN Projects, Litani River Authority, CDR) shows that:

- The institutional responsibilities for environmental management and river management overlap between national, regional and local authorities. (see **Table 1**),
- Due to these overlaps, there is clearly an institutional deficiency in river management,
- There is a lack of national and regional land use plans,
- Many different sector-specific, national plans for water supply and sanitation, solid waste, industrial pollution, roads etc. have already been developed and implemented. However, these sector plans are not guided by any national or regional plans,
- As rivers often flow over Casa or Mahafazat boundaries, different organizations are responsible and the river management-related information is spread between different regional and sectorial plans,
- Specifications and standards for eliminating environmental pollution on land, in the air and in water are contained in MoE Decision No. 52/1 dated 1996.(see Annex 2)
- There are some general directives but no regulations, decrees or laws for the protection and remediation of rivers,
- No guidelines are available concerning urban waste water treatment (over and above the minimum requirements for effluents from waste water treatment plants included in MoE Decision No. 52/1).

Apart from some directives general responsibilities these facts allow the following conclusions to be drawn with regard to the existing laws and regulations:

There are presently no laws or regulations concerning the protection and remediation of rivers in the Republic of Lebanon. Since river protection cannot be focused exclusively on water quality - although this is one of the most urgent issues - general regulations covering all aspects of river protection should be prepared.

The first step towards eliminating water pollution was taken by the Ministry of the Environment with the publication of Decision No. 52/1 in 1996. This decision incorporates new water and river-related specifications for:

- water destined for human consumption,
- the requirements relating to fresh water (surface water) intended for use either directly as drinking water or for the production of drinking water,
- the water quality requirements relating to aquatic life,
- the requirements relating to bathing water quality,
- the minimum quality standards that must be satisfied by the predominantly domestic discharge,
- overflow, discharge, storage or other actions which may affect the quality of surface water, underground water or seawater within territorial limits.

Table 1: Institutions with responsibility for river protection and river management

Organization	Responsibility
Ministry of Hydraulic and Electrical Resources (MHER)	<ul style="list-style-type: none"> • Overall responsibility for drainage, maintenance of waterways and monitoring of groundwater • General responsibility for water management; supervision of water authorities • Undertakes water development projects where autonomous authorities have no resources • Provides technical assistance for operations and management in the water sector and for the implementation of rehabilitation programs • Responsible for developing water resources, and for the design and implementation of infrastructure facilities • The approval of the MHER is required for expenditure on rehabilitation/development costs by water authorities
Ministry of Public Health (MPH)	<ul style="list-style-type: none"> • Able to recommend action to prevent pollution of water sources • Responsible for control of pollution at water intake points • Responsible for carrying out water sampling and analysis • Responsible for maintaining statistics on water-borne diseases • Provides technical assistance for water authorities in connection with installation, maintenance and operation of water quality-related equipment (e. g. chlorinators) • Review and approval of sewerage and drainage schemes
Ministry of the Environment (MoE)	<ul style="list-style-type: none"> • Monitoring of pollution from waste water activities • Monitoring of pollution from dumping sites • Responsible for the monitoring of waste collection and waste management • Responsible for the monitoring of nature conservation and land use • Responsible for the monitoring of industrial pollution • Definition of standards and technical conditions/specification for the construction of waste water treatment plants. • Nature conservation by monitoring the environmental equilibrium (Water, Air, Soil, Forest, Seashores, River banks, Marine and Terrestrial Fauna and Flora). • Definition of steps and standards to be followed by the industry and settlements in order to protect the environment.

Organization	Responsibility
Ministry of the Environment MoE (Cont'd)	<ul style="list-style-type: none"> ● Classification of sites and prepare laws and regulations for protecting these by declaring "Protected Areas" ● Definition and listing of chemicals and pesticides to be banned from import and/or produced.
Ministry of Industry	<ul style="list-style-type: none"> ● Responsible for industrial pollution Control. ● Responsible for industrial settlements in accordance with the MoE. ● Responsible for the development of new industrial areas
Council for Development and Reconstruction (CDR)	<ul style="list-style-type: none"> ● Provision of technical and financial assistance for various authorities ● Deciding on the institution (public, private sector) to implement infrastructure projects. ● Undertake and supervise all large scale development projects. ● Responsible for approving sewerage networks and funding 50% of such networks
Ministry of Transport	<ul style="list-style-type: none"> ● Responsible for roads along rivers (land use)
Department of Antiquities	<ul style="list-style-type: none"> ● Responsible for cultural heritage
Ministry of Agriculture	<ul style="list-style-type: none"> ● Responsible for land use ● Responsible for defining and listing pesticides to be used or banned. ● Responsible for agriculture and forests
National Litani Office (ONL)	<ul style="list-style-type: none"> ● Responsible for planning and management of the Litani basin
Ministry of Tourism	<ul style="list-style-type: none"> ● Responsible for tourism and the development of recreational areas
Autonomous Water Authorities (numbering 23 with 209 water and/or irrigation boards)	<ul style="list-style-type: none"> ● Responsible for provision of drinking and/or irrigation water for consumers ● Duty to operate and maintain infrastructure facilities provided by MHER ● In Tripoli and Beirut, authorities have delegated power to implement water supply works up to a certain level ● Responsible for maintenance of roadside ditches used for irrigation (shared with Ministry of Public Works or farmers; no clear delimitation of responsibilities)
Municipalities	<ul style="list-style-type: none"> ● Responsible for provision and maintenance of sewer and drainage systems ● Responsible for funding 50% of construction costs of sewerage networks

5. New Guidelines

Guidelines and regulations for the protection and remediation of rivers and river landscapes in Lebanon have been prepared. These guidelines and regulations should be implemented in order to create a foundation for all future river protection activities.

During interviews with various authorities, it was found out that regulations which cover the aspects of river protection are either lacking or inadequate.

It appears to be impossible to implement new regulations for the different areas (for example roads, buildings, industry, settlements agriculture, hydropower, flood protection, nature conservation, tourism, etc.) in the short to medium term.

In view of this, developing general guidelines for the protection and remediation of rivers and river landscapes in the Republic of Lebanon on the basis of Fichtner's experience seem to be the most appropriate approach to improving the river protection in Lebanon.

These guidelines were developed within the framework of the present consultancy services and can be found in **Annex 3**.

The implementation phases of these guidelines are described in the following section 5.1.

5.1 Guideline for the protection and remediation of rivers and river landscapes in the Republic of Lebanon

This guideline is attached as Annex 3. Supplementary explanation and comments for the implementation of the guidelines are stated below.

Article 1

Article 1 is a general article which describes the general aims of this guideline and the need for rehabilitation of the Lebanese rivers.

In order to fulfill the guidelines given in part I, the following activities have to be taken for the protection and remediation of rivers and their surrounding landscapes.

Article 2

(1) For the evaluation of the existing situation a joint program of measurements and investigations to demonstrate the quantity as well as quality of the waters, sediments and effluents has to be developed.

A program of measurements for the main rivers in Lebanon is necessary in order to obtain information on their flows and degree of pollution. Without this information, it will be very difficult to discuss and propose further action. If excessively rigid standards are adopted as a result of overreaction, the high cost will mean that only limited action will be taken, so that the benefits for the environment will be less than if the same amount of money were to be spent on establishing more plants of a lower standard. On the other hand, if the standards that are adopted are too low, the environment will not be sufficiently protected.

➔ The ToR for consultancy services for an investigation program have been prepared and can be found in volume two.

(2) Surveys showing major point sources of discharges of harmful materials (discharge charts and waste water register) from industry, settlements and other sources like landfills have to be prepared and water pollution from diffuse sources has to be estimated and extrapolated.

In order to obtain more reliable information concerning the discharge of waste water from industry and settlements into the environment, it is necessary to investigate the main sources of these discharges. Both the waste water quantities and their qualities have to be investigated, as well as the possibilities for river pollution outside normal operation (accidents). A computerized discharge register should be installed for the

purposes of this investigation, with the option of a link to a GIS system, and the data acquired for this register analyzed on site.

→ The ToR for consultancy services for this part and for the computer software have been prepared and can be found in volume two.

Article 3

Article 3 describes the activities necessary for the implementation of guidelines for waste water collection and treatment. These concern quality, the objectives of discharges based on the water use and the classification of rivers according to their pollution. The implementation procedures and the actions that result from the guidelines form an integral part of all other actions as described in the following articles.

(1) A staged program for urban waste water collection and treatment according to the risks and effects to the receiving waters and the quantity and pollution of the discharge has to be developed.

In order to derive general guidelines within a fixed time frame, it is necessary to develop a program showing which kind of effluent has to be treated when and to which extent. For example, sewage from small communities that discharge to less sensitive areas can be treated to a lower standard than that from big cities which discharge their effluents to sensitive areas used for irrigation and/or recreation.

→ In accordance with the EC Council Directive of 21 May 1991 (91/271/EEC) concerning urban waste water treatment, guidelines for the treatment of such water in the Republic of the Lebanon were prepared and can be found in the attached **Annex 4**.

(2) Specific quality objectives taking account of the requirements with regard to the use of the waters, the particular conditions of the river course and the natural aquatic communities have to be developed.

Different criteria for the quality of the water have to be taken into consideration, depending on the use of the river water and the surrounding areas. It is thus necessary to establish different requirements for different water uses.

→ The following relevant requirements concerning specifications and standards for eliminating environmental pollution on land, in air and in water have been published by the MoE in Decision No 52/1:

- Quality requirements for fresh water (surface water) intended for use either directly as drinking water or for the production of drinking water
- Water quality requirements relating to aquatic life
- Requirements relating to bathing water quality

(3) Standardized methods for the classification of river water qualities have to be compiled.

This section addresses the need for a classification system for all Lebanese rivers. The aim of this system will be to enable all rivers to be classified using one standard, so that the water quality guidelines for different receiving water bodies, as set out in MoE Decision No 52/1, can be enforced.

→ The ToR for consultancy services for a standardized classification program have been prepared and can be found in volume two.

Article 4

Program for the design and construction of waste water treatment plants for the reduction of discharges of harmful materials from the point sources of both settlements and industry as well as programs for the reduction a pollution from diffuse sources have to be implemented including timetables and cost assessments.

A program must be developed on the basis of the findings of the actions set out in Articles 2 and 3, a setting out the necessary actions that must be taken to reduce harmful discharges into the rivers. Depending on the pollution load and on the required quality of the receiving water, this program must show whether or not and how it is possible to achieve this quality. The diffuse sources, such as drainage from agricultural areas (fertilizers and pesticides, for example) also have to be included in this program. The time frame and the costs for implementing the program must be shown and taken into consideration.

→ The ToR for consultancy services for this part have been prepared and can be found in volume two.

Article 5

Protective measures such as emergency basins or oil separators to prevent water pollution resulting from accidents have to be developed.

River pollution is possible not only as a result of discharges during normal operation of an industrial plant, but also subsequent to accidents. Some of the worst pollution in international rivers has been detected after accidents in industrial plants or on roads near river beds. It is thus also necessary to protect the rivers from these potential forms of pollution. Clearly, 100 per cent safety is impossible to achieve, yet programs that reduce the risk to a minimum nevertheless have to be developed.

→ This point should be elaborated more in detail in a future National Emergency Response Plan.

Article 6

(1) The main elements that constitute a river landscape have to be analyzed and classified and an inventory of land use on the main river basins has to be prepared.

At the present time, there is definitely no plan showing the actual situation of landscapes and land use along the river beds and in the surrounding areas. This information is essential for future river protection. In order to obtain it, land use maps have to be prepared and a classification of the land carried out. Typical land use categories for the areas surrounding the rivers - based on those already used in Lebanon - must be defined and the land use investigated for this purpose.

→ The ToR for consultancy services for this part have been prepared and can be found in volume two.

(2) The hydrological situation in the river areas has to be described and the main influencing factors have to be recorded.

Although some information is already available, its source and age cannot be verified. The hydrological situation in the river beds, overflow areas and river mouths can be calculated with the aid of the information in Article 2 (1) and the long-term rainfall information, together with data concerning the discharge of stormwater from urban areas. These calculations are one of the main prerequisites of protection against flooding of houses, roads and recreational facilities and are essential for the development of zoning plans as described in Article 7.

→ The ToR for consultancy services for this part have been prepared and can be found in volume two.

(3) Documents regarding the ecological importance of the various biotope elements of the waters and proposals regarding the improvement of conditions for aquatic and coastal communities have to be prepared.

This article describes the need to prepare documents testifying to the ecological importance of the various biotope elements of rivers and their surrounding landscapes. The aim of this article is to show the sensitive biotope elements and their interaction as well as the watercourses that act as binding elements between the flora, fauna, landscape and human interests.

→ The ToR for consultancy services for the preparation of documents showing the importance of the various biotope elements and listing proposals regarding improvements to conditions have been prepared and can be found in volume two.

(4) Planned and existing types of utilization of the waters, which may have serious regional repercussions including hydraulic structures and regulation of the waters, have to be investigated.

In addition to being employed by communities and industry as waste water sewers and drainage systems, Lebanese rivers are used, for example, for fishing, irrigation of agricultural areas, cooling water, preparation of drinking water, recreation, swimming, hydropower generation etc. The planned and existing types of utilization of the water in the different rivers are not presently known in sufficient detail. A knowledge of the existing types of utilization as well as hydraulic and water regulation structures is necessary for the remediation of the rivers and for the development of land use plans. This article describes the investigation of these aspects.

- The ToR for consultancy services for the investigation of planned and existing types of utilization of the waters, which may have serious regional repercussions including hydraulic structures and regulation of the waters, have been prepared and can be found in volume two.

Article 7

Zoning plans and nature conservation plans for the surrounding areas of the main rivers including staged action plans for measures to be taken for the implementation of these plans have to be developed.

Many different development and implementation plans for various sector-specific actions (electricity, water supply, sanitation, roads, etc.) have been developed in recent years. However, these plans, which are described by many sources, are not guided by a national or regional land use plan. An added difficulty in drawing up land use plans for rivers is that river courses flow over political and/or legal borders. Moreover, the drainage areas of rivers are often spread over different Casas and/or Mohafazats or form the border between them. It is thus very difficult to develop land use or zoning plans on the Casa or Mohafazat level. Zoning plans and nature conservation plans for river areas therefore have to be developed on a national level. The results of the activities described in Article 6 have to be compiled. Both the zoning plans and the findings show that the area should be protected; nature conservation plans must be developed.

- The ToR for consultancy services for the development of zoning plans and nature conservation plans for selected main rivers, including staged action plans, have been prepared and can be found in volume two.

5.2 Guidelines concerning urban waste water treatment

In accordance with Article 3 (1) of part 2 of the Guideline for the Protection and Remediation of Rivers and River Landscapes in the Republic of Lebanon (see section 5.1), and on the basis of the EC Council Directive of May 21st, 1991 (91/271/EEC), guidelines concerning urban waste water treatment have been developed. These guidelines are attached as Annex 4.

The dates given in this guideline were prepared on the basis of an implementation commencing in 1998.

The following points, which are essential for protecting the environment against pollution from urban waste water are covered by this guideline:

- This guideline is not only valid for river protection. It is also applicable to the protection of other water bodies, such as groundwater and coastal waters.
- Receiving waters must be protected against the consequences of insufficiently treated urban waste water which is disposed of, by establishing secondary treatment as a standard practice.
- There is a necessity for more stringent treatment in sensitive areas in parallel with lower standards in certain less sensitive areas.
- There is a need to implement general rules and regulations and/or specific authorizations for discharging industrial waste water as well as for waste water and sludge discharged from urban waste water treatment plants.
- Biodegradable industrial waste water which is not treated in urban waste water treatment plants should satisfy appropriate requirements before being discharged to receiving waters.
- Sludge arising from waste water treatment plants should be recycled, whereas the disposal of this sludge to surface water should be phased out.
- Treatment plants, receiving water and the disposal of sludge should be monitored in order to protect the environment from the adverse effects of waste water discharge.

It should be pointed out that, for the services which have to be completed within 8 weeks, it has not been possible to approve the costs resulting from the implementation of this guideline.

Nevertheless, it would appear to be feasible to implement the collecting systems and treatment plants for urban waste water by the specified dates. It must also be pointed out that, particularly in view of the conditions prevalent in Lebanon, where the majority of receiving surface water bodies are used for irrigation, the task of collecting and treating urban waste water is vital. The risks to human health arising from the use of untreated waste water, especially during the dry summers where some surface waters consist of little more than waste water sources, are extremely high.

Furthermore, it is impossible to remediate the rivers without collecting and treating urban waste water. As mentioned in various sources, most potable water in Lebanon is polluted as a result of discharges of untreated or insufficiently treated urban waste water. The implementation of this guideline thus forms an essential element of river protection as well as the protection of potable water sources.

5.3 Approval of the guidelines

The guidelines discussed in the previous chapters have been prepared on the basis of various national and international guidelines and regulations. As described in the ToR, these guidelines should be subject to approval by the MoE. They must therefore be supplemented with specific legal aspects by the MoE and other involved authorities prior to implementation.

6. Terms of Reference

Based on the guidelines described in Volume Two, Terms of Reference for

Consultancy Services for river protection and remediation in Lebanon

Remediation of Nahr Ibrahim and upper Litani River Area

were developed.

These Terms of Reference contain the conditions of agreement, time schedule and the guidelines, and are compiled in volume two of this report.

List of Annexes

- | | |
|---------|---|
| Annex 1 | ToR for this Consultancy services |
| Annex 2 | MoE Decision No. 52/1 |
| Annex 3 | Guidelines for the Protection and Remediation of Rivers and River Landscapes in the Republic of Lebanon |
| Annex 4 | Guidelines for the treatment of urban waste water from the Republic of Lebanon |
| Annex 5 | Table of possible river classification criteria |

ANNEX 1 Terms of Reference
for the present
Consultancy Service

Ministry of the Environment - Decision No 52/1

Concerning specifications and standards to eliminate environmental pollution on land, air and water
In accordance with: decree 6812 of 25/5/95 (formation of government)
 decree 6905 of 26/6/95 (appointment of Minister for the Environment)
 law 216 of 8/4/93

It was decided as follows:

Article No 20b concerning specifications on environmental matters is hereby cancelled and the new specification is as follows:

- 1 Standards applicable to water for human consumption -
 - bacteriological parameters
 - physico-chemical parameters for natural constitution of water
 - parameters for undesirable substances
 - pesticides and related substances
 - toxic substances
 - microbiological parameters
- 2 Quality requirements for fresh water (surface water) for use as drinking water or intended for use in the production of drinking water
 - 1 bacteriological parameters
 - 2 physico-chemical parameters, related to natural composition
 - 3 parameters for undesirable substances
 - 4 parameters for toxic substances
 - 5 microbiological parameters
- 3 Water quality requirements for aquatic life
temperature, dissolved oxygen, pH, suspended solids, BOD₅ (mg/l O₂), total phosphorus (mg/l PO₄), nitrites (NO₂), phenolic compounds (mg/l C₆H₅OH), hydrocarbons of petroleum origin, non-ionised ammonia (mg/l NH₃), ammonium ion (mg/l NH₄), residual chlorine (mg/l HOCl), total zinc, soluble copper.
- 4 Requirements for bathing water quality
 - swimming pools
 - sea, rivers & lakes
- 5 Characteristics of urban wastewater
 - daily pollution load per person
 - characteristics of urban wastewater before treatment
 - characteristics of treated water regardless of treatment type
- 6 Minimum quality standards for a predominantly domestic discharge
 - minimum quality of effluent (for different types of treatment)
 - levels of nitrogen and phosphorus
- 7 Specification for overflows, discharges, storage or other actions which may affect quality of surface water, underground water and sea water within territorial limits. (discharge of negligible harmfulness)
- 8 Discharges other than urban wastewater in sea outfalls more than 500 m from the shore
- 9 Limiting values for exposure to various substances in work places
- 10 Limiting values for sound levels
- 11 Limiting values to be observed when incinerating used oil (incinerators of thermic capacity > 3mW)
- 12 Limiting values to be observed when incinerating household waste
- 13 Limiting values for emissions from cement factories
- 14 Maximum permitted concentrations for atmospheric pollutants

ANNEX 2 MoE Decision No. 52/1

Future Work to be done according to the ToR from present Assignment:

- Engineering program for the implementation of the guidelines for all Lebanese rivers(masterplan)**
- Site evaluation
 - Improvement and actualization of existing maps
 - Definition of sampling sites, quality and quantity analysis
 - Preparation of tender and contract documents for sampling and analyzing of water and mud quality
 - Evaluation of the analyses and establishment of a river pollution map with classification of the rivers
 - Analysis and classification of the main elements that constitute a river landscape
 - Preparation of an inventory of land-use on river basins
 - Installation and establishment of a computerized wastewater register for registration of dischargers
 - Evaluation of the main dischargers
 - Training of MoE's personal in the collection of data and the use of the computerized discharge register
 - Preparation of a staged program to reduce the pollution of the rivers in a given timeframe
 - Development and costs estimation for short, medium and long term preserve/re-mediation scenarios
 - Assistance and training of MoE's personal with the building up of a program for the controlling of wastewater discharge to the rivers

Implementation and Enforcement by MoE:

Implementation of River Management Legislation

- Engineering project for recommendations and projects for the re-mediation of the Lake Karaoun and the up-stream Litani river**
- Detailed site evaluation of the project region
 - Detailed approval of the program formulated under 2.
 - Design of individual re-mediation projects for the cleaning up of Lake Karaoun and the upper Litani river
 - Cost estimation for the re-mediation projects
 - Evaluation of the economic and ecological feasibility of the planned projects
 - Preparation of tender documents for the proposed projects
 - Assistance of the MoE during the tendering of the projects
 - Evaluation of tenders for the re-mediation projects
 - Assistance to the MoE during contract negotiations
 - Site supervision during the different re-mediation projects
 - Detailed evaluation of the possibilities for the reduction of concentration and quantity of the waste water streams
 - Formulation of necessary projects which have to be implemented by the dischargers
 - Assistance to the dischargers for process selection
 - Assistance to the MoE and training of MoE's personal with the approval of permitting documents
 - Assistance of the MoE with the formulation of licenses

Work to be performed under present assignment:

1. General guidelines for the management of Lebanese Rivers. (River Management Legislation)
2. ToR, tender specification and contract documents for an engineering program for the implementation of the above guidelines for all Lebanese rivers (masterplan)
3. ToR, tender specification and contract documents for an in depth engineering program which should result in recommendations and projects for the re-mediation of the Lake Karaoun and the up-stream Litani river

SECTOR IMPLEMENTATION UNIT # 3

Terms of Reference

Preparation of Guidelines for the Management of Lebanese Rivers, for the Preparation of Tender Specifications for a Program for the implementation of this Guidelines as well as for a Program to environmentally re-mediate the Lake Karaoun and the contributory upper Litani River in the Bekaa Valley.

1.) Background and Objective of the Project

There is virtually no treatment of liquid effluents from industrial establishments as well as no treatment of sewage out of settlements in big parts of Lebanon. The effluents are mostly discharged to surface and coastal waters, imposing serious environmental stress on surface water and the areas and locations most affected. Liquid discharges from food processing, wineries, tanneries, glue and sugar factories, papermills, breweries, olive presses and sewage are channeled to river courses. Laws and regulations concerning the management of rivers and discharge of effluents to rivers did not exist. Wastewater dischargers to the rivers as well as the quality of the wastewater discharged to the rivers are mostly unknown.

The objectives of this project are:

1. to formulate general guidelines for the management of the Lebanese rivers. These guidelines are to be used as basis for a governmental decree to environmentally re-mediate and manage the Lebanese rivers
2. to prepare ToR for an engineering program for the implementation of this guidelines for all Lebanese rivers and the implementation of river classification as well as a computerized wastewater discharge register
3. to prepare ToR for an in depth engineering program which should result in recommendations and projects for the re-mediation of the Lake Karaoun and the upstream Litani river as a case for the environmentally re-mediation of one of the most polluted areas of Lebanon.

2.) Methodology and Terms of Reference

The consultant shall review and study the available documents and familiarize himself with the localities in the region. In order to gain access to any required agencies, installations etc., he will be supported by SIU # 3 and an assigned staff member from the Ministry of Environment.

He will furnish an updated time schedule and a preliminary work plan upon his arrival in Beirut.

These site visits shall be conducted within one week.

Additional data gathering shall be performed as required.

The documents prepared by the consultant in close cooperation with SIU #3 shall include the following requirements but shall not be limited to:

1. Preparation of guidelines

- Site evaluation to familiarize with the general situation of Lebanese rivers
- Evaluation and discussion of existing laws and regulations
- Preparation of guidelines for the management of Lebanese rivers as basis for a government decree for the protection and management of these rivers.
- Preparation of guidelines for the discharge of wastewater to rivers
- Preparation of a guideline for the classification of rivers according their pollution
- General discussion of the role of Urban Planning Directorate, Ministry of Electricity and Hydraulic Resources, Ministry of Environment in the protection and management of rivers.
- Handing over of the draft guidelines to the MoE for approval. Legal input from the MoE will be required.
- Finalization of guidelines, considering the legal input from MoE

2. Preparation of ToR for an engineering program for the implementation of the above guidelines for all Lebanese rivers (masterplan). The program for which the ToR shall be prepared by the consultant shall include the following requirements but shall not be limited to:

- Site evaluation
- Improvement and actualization of existing maps
- Definition of sampling sites, quality and quantity analysis
- Preparation of tender and contract documents for sampling and analyzing of water and mud quality as well as water quantity of the main rivers of Lebanon
- Evaluation of the analyses and establishment of a river pollution map with classification of the pollution according to the guidelines
- Analysis and classification of the main elements that constitute a river landscape
- Preparation of an inventory of land-use on river basins
- Installation and Establishment of computerized wastewater register for the registration of all relevant wastewater dischargers from industries, agriculture and settlements with the possibility to connect it later to a GIS-system
- Evaluation of the main dischargers together with MoE's personal by site inspections
- Training of MoE's personal in the collection of data and the use of the computerized discharge register
- Preparation of a staged program to reduce the pollution of the rivers in a given timeframe including programs for the cleaning of industrial wastewater as well as installation of sewage treatment plants
- Development and estimation of costs for short, medium and long term preserve/re-mediation scenarios
- Assistance and training of MoE's personal with the building up of a program for the controlling of wastewater discharge to the rivers

3. Preparation of ToR for an in depth engineering program which should result in recommendations and projects for the re-mediation of the Lake Karaoun and the upper Litani river. The program for which the ToR shall be prepared by the consultant shall include the following requirements but shall not be limited to:

- Detailed site evaluation of the project region including the catchment area of the upper Litani river and Lake Karaoun based on the investigation of 2.
- Detailed approval of the program formulated under 2. for the project region.
- Design of individual re-mediation projects for the cleaning up of Lake Karaoun and the upper Litani river
- Cost estimation for the re-mediation projects
- Evaluation of the economic and ecological feasibility of the planned projects
- Preparation of tender documents for the proposed projects
- Assistance to the MoE during the tendering of the projects
- Evaluation of tenders for the re-mediation projects
- Assistance to the MoE during contract negotiations
- Site supervision during the different re-mediation projects
- Detailed evaluation of the possibilities for the reduction of concentration and quantities of the waste water streams, discharged into the upper Litani river and Lake Karaoun
- Formulation of necessary projects which have to be implemented by the dischargers from industries and communities
- Assistance to the MoE in the formulation of regulations/degrees to enforce the implementation
- Assistance to the dischargers with the selection of wastewater treatment processes and /or consultants
- Assistance to the MoE in the approval of permitting documents and training of MoE's personnel
- Assistance to the MoE in the formulation of licenses for the discharge of wastewater and for the construction and operation of wastewater treatment plants

3.) Input to the Project

One international Consultant with strong background in the environmental rehabilitation of water courses and environmental engineering and management. He shall have also international experience in the lay-out and design of water and sewage treatment plants

4.) Output of the project

1. Guidelines for River management.
2. Terms of Reference, Tender Specification and Contract documents for an engineering program for the implementation of the above guidelines for all Lebanese rivers (masterplan).
3. Terms of Reference, Tender Specification and Contract documents for an in depth engineering program which should result in recommendations and projects for the re-mediation of the Lake Karaoun and the up-stream Litani river.

The output of this part of the project as well as of the whole project can be seen from attached annex 1.

5.) Time Schedule

The project duration is two man-month, commencing on 01.03.1998 and ending not later than 30.04.1998

The proposed Time schedule is attached as annex 2.

قَرَارَات

وزارة البيئة

قرار رقم ١/٥٢

يتعلق بتحديد المواصفات والنسب الخاصة للحد من تلوث الهواء والمياه والتربة

ان وزير البيئة،

بناء على المرسوم رقم ٦٨١٢ تاريخ ٩٥/٥/٢٥ (تشكيل الحكومة).

بناء على المرسوم رقم ٦٩٠٥ تاريخ ٩٥/٦/٢٦ (تعيين وزير البيئة)،

بناء على القانون رقم ٢١٦ تاريخ ٩٣/٤/٨.

يقرر ما يأتي:

المادة الاولى: يبنى القرار رقم ٢٠/ب المتعلق بتحديد المواصفات والتدابير الخاصة لحماية البيئة من التلوث وتحدد المواصفات الواجب التقيد بها بالنسبة للهواء والمياه والتربة وفق المعدلات، كما هي وارادة في الملحقات التالية:

- ١- ملحق رقم المواصفات المتعلقة بمياه الشرب
- ٢- ملحق رقم المتطلبات النوعية للمياه العذبة السطحية المستعملة او المعدة للاستعمال لانتاج المياه الصالحة للاستهلاك البشري
- ٣- ملحق رقم النوعية المطلوبة للمياه الصالحة للحياة المائية.
- ٤- ملحق رقم مواصفات المياه الصالحة للسباحة: احواض، انهار، بحيرات وبحار.
- ٥- ملحق رقم مواصفات المياه المبتذلة الحضرية.
- ٦- ملحق رقم مستويات الحد الأدنى لنوعية مياه الصرف المنزلية بعد المعالجة.
- ٧- ملحق رقم المواصفات المسموح بها لتصريف او طمر نفايات سائلة او صلبة في المياه السطحية، الجوفية ومياه البحر داخل الحدود الدولية (نفايات لا يعتد بضررها).
- ٨- ملحق رقم المواصفات لبعض المواد الضارة عند صرفها في البيئة البحرية داخل الحدود الدولية (نفايات سائلة غير منزلية).
- ٩- ملحق رقم الحدود القصوى لملوثات الهواء داخل أماكن العمل.
- ١٠- ملحق رقم الحدود المسموحة لشدة الصوت ومدة التعرض الآمن له.
- ١١- ملحق رقم الحدود القصوى المسموح بها لملوثات الهواء في الانبعاثات الناجمة عن حرق الزيوت المستعملة.
- ١٢- ملحق رقم الحدود القصوى المسموح بها لملوثات الهواء في الانبعاثات الناجمة عن حرق النفايات المنزلية.
- ١٣- ملحق رقم الحدود القصوى المسموح بها لملوثات الهواء من الانبعاثات في معامل الترابية.
- ١٤- ملحق رقم الحدود القصوى لملوثات الهواء الخارجي.

المادة الثانية: يعمل بهذا القرار فور نشره في الجريدة الرسمية.

بيروت، في ٢٩ تموز ١٩٩٦

وزير البيئة

بيار فرعون

ملحق رقم ١
المواصفات المتعلقة بجياه الشرب
Normes Applicables aux Eaux Destinées
à la Consommation Humaine
Les paramètres organoleptiques
التي ائبت الحسية

الترابف	Paramètres	الوحدة	Unité	القيمة الذبيلة	Niveau guide	الحد الأقصى المقبول	Valleur maximale admissible
مجموع الكوليفورم	Coliformes totaux	عدد/١٠٠٠ مل	nombre/100ml	صفر	0	صفر	0
المكورة العقبة العائطة	Streptocoques fécaux	عدد/١٠٠٠ مل	nombre/100ml	صفر	0	صفر	0
الكوليفورم العائطة	Coliformes fécaux	عدد/١٠٠٠ مل	nombre/100 ml	صفر	0	صفر	0
البكتوريا المحولة للكربف	Bactéries sulfitoréductrices	عدد/٢٠ مل	nombre/20ml	-	-	واحد	1
الكوليفورم المقارمة للحرارة	Coliformes thermotolérants	عدد/١٠٠ مل	nombre/100ml	صفر	0	صفر	0
السالمونيلا	Salmonelles	عدد/٥ لفر	nombre/5 L	صفر	0	صفر	0
الستافيلوكوك المروضنة	Staphylocoques pathogènes	عدد/١٠٠٠ مل	nombre/100 ml	صفر	0	صفر	0
ملائهم الجرثفم العائطة	Bactériophages fécaux	عدد/٥٠ مل	nombre/50 ml	صفر	0	صفر	0
الفيروسات المعوية	Entérovirus	عدد/١٠ لفر	nombre/10 L	صفر	0	صفر	0

Les paramètres physico-chimiques en relation avec la constitution naturelle de l'eau
الترابث للفيزيو كيميائية المتعلقة بالتركيب الطبيعي للمياه

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	الترابث
25	٢٥	12	١٢	°C	درجة مئوية	Température	الحرارة
9	٩	6.5 < pH < 8.5	٦,٥ > pH < ٨,٥	Unité pH	وحدة أس هيدروجيني	pH	الأس الهيدروجيني
-	-	400	٤٠٠	m S/cm à 20°C	ملليسيمنز / سم على ٢٠م	Conductivité	التوصيل الكهربائي
200	٢٠٠	25	٢٥	mg/L Cl	مغ/ل كلوريد	Chlorures	الكلوريد
250	٢٥٠	25	٢٥	mg/L SO4	مغ/ل سلفات	Sulphates	السلفات
150	١٥٠	20	٢٠	mg/L Na	مغ/ل صوديوم	Sodium	الصوديوم
12	١٢	10	١٠	mg/L K	مغ/ل بوتاسيوم	Potassium	البوتاسيوم
50	٥٠	30	٣٠	mg/L Mg	مغ/ل ماغنيزيوم	Magnésium	المغنيزيوم
-	-	100	١٠٠	mg/L Ca	مغ/ل كالسيوم	Calcium	الكالسيوم
0.2	٢,٠	0.05	٠,٠٥	mg/L Al	مغ/ل الألمنيوم الكلي	Aluminium total	الألمنيوم الكلي
1500	١٥٠٠	-	-	mg/L à 180°C	مغ/ل على ١٨٠م	Résidus secs	البقايا الجافة

Les paramètres concernant les substances indésirables
التوابت المتعلقة بالمواد غير المرغوب بها

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	التوابت
50		25	٧٥	mg/L NO3	مغ/ل نترات	Nitrates	نترات
0		-	-	mg/L NO2	مغ/ل نيتريت	Nitrites	نيتريت
0.5		0.05	٠,٠٥	mg/L NH4	مغ/ل امونيوم	Ammonium	امونيوم
1		-	-	mg/L N	مغ/ل آزوت	Azote Kjeldahl	أزوت كجلدال
5		2	٢	mg/L O2	مغ/ل اوكسيجين	Oxydabilité (à KM no4 en milieu acide après 10 mn à chaud)	التأكسد (بواسطة KM no4 في برمنجات البوتاسيوم في وسط حمضي بعد ١٠ دقائق على الساخن)
pas détectable organoleptiquement	غير مكتشف حسيًا	-	-	mg/L H2 S	مغ/ل هيدروجين مكبرت	H2S	الهيدروجين المكبرت
0.5		-	-	µg/L d'indice phénol	المؤشر الفينولي	Phénols	الفينولات
10		-	-	µg/L	مغ/ل	Hydrocarbures dissous ou émulsionnés après extraction avec le tétrachlorure de carbone	الهيدروكربورات الذائبة أو المعلقة بعد استخلاصها برباعي كلورور الميثان
0.2		-	-	mg/L lauryl sulfate	مغ/ل سلفات اللوريل	Agents de surface réagissant avec le bleu de méthylène	عوامل سطحية متفاعلة مع أزرق الميثيلان

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدنيا	Unité	الوحدة	Paramètres	الثابت
200	٢٠٠	50	٥٠	µg/L Fe	مكغ/ل حديد	Fer	حديد
50	٥٠	20	٢٠	µg/L Mn	مكغ/ل منغنيز	Manganèse	مانغنيز
1	١	0.1	٠,١	mg/L Cu	مكغ/ل نحاس	Cuivre	نحاس
5	٥	0.1	٠,١	mg/L Zn	مكغ/ل زنك	Zinc	زنك
5	٥	٥,4	٠,٤	mg/L P2O5	مكغ/ل فوسفور	Phosphore	فوسفور
10	١٠	-	-	µg/L Ag	مكغ/ل فضة	Argent	فضة
1500 (8°C-12°C) 700 (25°C-30°C)	١٥٠٠ (٢٠١٢ - ٢٠٨) ٧٠٠ (٢٢٥ - ٢٣٥)	-	-	µg/L F	مكغ/ل فلور	Fluor	فلور
-	-	100	١٠٠	µg/L Ba	مكغ/ل باريوم	Barium	باريوم
-	-	1	١	µg/L	مكغ/ل	Produits organochlorés autre que pesticides	المركبات العضوية الكلورية غير المبيدات
0.2	٠,٢	-	-	µg/L	مكغ/ل	Hydrocarbures Polycycliques Aromatiques HPA: - Fluoranthène - Benzo (3,4) Fluoranthène - Benzo (1,1,12) Fluoranthène - Benzo (3,4) pyrène - Benzo (1,12) pérylène - Indéno (1,2,3) pyrène - Benzo (3,4) pyrène	هيدروكربورات عطرية متعددة الحلقات
0.01	٠,٠١	-	-	µg/L	مكغ/ل	- Benzo (3,4) pyrène	

Les pesticides et les substances apparentées
المبيدات والمواد المشابهة

Paramètres	الثوابت	الوحدة	Unité	القيمة الدليلية	Niveau guide	الحد الأقصى المسموح	Valeur maximale admissible
Pesticides organochlorés	مبيدات كلورينية عضوية	مكغ/ل	µg/L	-	-	٠,١	0.1
Pesticides organophosphorés	مبيدات فوسفورية عضوية	مكغ/ل	µg/L	-	-	٠,١	0.1
Carbamates	كربامات	مكغ/ل	µg/L	-	-	٠,١	0.1
Herbicides	مبيدات أعشاب	مكغ/ل	µg/L	-	-	٠,١	0.1
Fongicides	مبيدات فطرية	مكغ/ل	µg/L	-	-	٠,١	0.1
PCB	معددة الكلور ثلاثية الفينول	مكغ/ل	µg/L	-	-	٠,١	0.1
PCT	معددة الكلور ثلاثية الفينول	مكغ/ل	µg/L	-	-	٠,١	0.1
Aldrine	الدرين	مكغ/ل	µg/L	-	-	٠,٠٣	0.03
Dieldrine	دي الديرين	مكغ/ل	µg/L	-	-	٠,٠٣	0.03
Hexachloro-benzène	سداسي كلوروبنزين	مكغ/ل	µg/L	-	-	٠,٠١	0.01
Total des substances mesurées	المواد مختصة	مكغ/ل	µg/L	-	-	٠,٥	0.5

Les paramètres concernant les substances toxiques
النواتج المتعلقة بالمواد السامة

Valeur maximale admissible	حد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	النواتج
50	٥٠	-	-	µg/L As	مغ/ل زرنيخ	Arsenic	الزرنيخ
5	٥	-	-	µg/L Cd	مغ/ل كاديوم	Cadmium	كاديوم
50	٥٠	-	-	µg/L CN	مغ/ل سيانيدات	Cyanures	السيانيدات
50	٥٠	-	-	µg/L Cr.	مغ/ل كروم كلي	Chrome total	الكروم الكلي
1	1	-	-	µg/L Hg	مغ/ل زئبق	Mercur	زئبق
50	٥٠	-	-	µg/L Ni	مغ/ل نيكل	Nickel	النيكل
50 dans l'eau courante	٥٠ في المياه الجارية	-	-	µg/L Pb	مغ/ل رصاص	Plomb	رصاص
10	1٠	-	-	µg/L Se	مغ/ل سينيوم	Selenium	سينيوم
10	1٠	-	-	µg/L Sb	مغ/ل أنتيمون	Antimoine	انتيمون

Les paramètres microbiologiques
النواتج الميكروبيولوجية

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	النواتج
15	1٥	1	1	mg/L P/Co	مغ/ل بلاكتيوم / كوبالت	Couleur	اللون
4	4	0.4	٠.٤	faekson	فاكسون	Turbidité	العكر
2 à 12°C	٢ على ١٢	0.112°C	٠ على ١٢	taux de dilution:2	درجة التخفيف: ٢	Odour	الرائحة
3 à 25°C	٣ على ٢٥	0.225°C	٠ على ٢٥	taux de dilution:3	درجة التخفيف: ٣		
2 à 12°C	٢ على ١٢	0.212°C	٠ على ١٢	taux de dilution:2	درجة التخفيف: ٢	Saveur	الطعم
3 à 25°C	٣ على ٢٥	0.225°C	٠ على ٢٥	taux de dilution:3	درجة التخفيف: ٣		

ملحق رقم ٢
 المتطلبات النوعية للمياه العذبة المغطاة المستعملة أو المعدة للاستعمال
 لإنتاج المياه الصالحة للاستهلاك البشري
 Exigences de qualité des eaux douces superficielles utilisées ou destinées à être utilisées
 pour la production d'eau destinée à la consommation humaine

1- PARAMETRES ORGANOLEPTIQUES

١- الثوابت الحسية

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	Unité	الوحدة	Parameters	الثوابت
20	٢٠	10	١٠	mg/L (échelle Pt)	مغ/لتر (سلم اللاتين)	Coloration (après filtration simple)	اللون (بعد ترشيح بسيط)
-	-	3	٣	Facteur de dilution à 25°C	عامل التخفيف على ٢٥ درجة مئوية	Odeur	الرائحة

2- PARAMETRES PHYSIO-CHEMIQUES

٢- الثوابت الفيزيوكيميائية المتعلقة بالتركيب الطبيعي للمياه

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	Unité	الوحدة	Parameters	الثوابت
-	-	1000	١٠٠٠	μ siemens/cm à 20°C	ميكرو سيمنز/سم على ٢٠ درجة مئوية	Conductivité	التوصيل الكهربائي
25	٢٥	٢٢	٢٢	°C	درجة مئوية	Temperature	الحرارة
-	-	٨,5-٥,5	٨,٥ - ٦,٥	Unités phi	وحدة الاس الهيدروجيني	pH	الاس الهيدروجيني

Valcur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الأدلية	Unité	الوحدة	Paramètres	الترايت
-	-	200	٢٠٠٠	mg/L Cl	مغ/ليتر كلور	Chlorures	الكالوريدات
250	٢٥٠	150	١٥٠	mg/L SO4	مغ/ليتر SO4	Sulfates	سولفات
-	-	25	٢٥	mg/L	مغ/ليتر	suspension Matières en	مواد معلقة
-	-	<	اصغر من ٣	mg/L O2 à 20 °C sans nitrification	مغ/ليتر اوكسجين على ٢٠ درجة مئوية	DBO5	الاوكسجين الحيوي الممتص
-	-	>70	أكثر من ٧٠	% O2	% اوكسجين	Taux de saturation en oxygène dissous	درجة التشبع بالاكسجين الذائب

3-PARAMETRES CONCERNANT LES SUBSTANCES INDESIRABLES
٣ - الترايت المتعلقة بالمواد غير المرغوب فيها

Valcur maximale admissible	الحد الأقصى المقبول	Ritrem guide	القيمة الأدلية	Unité	الوحدة	Paramètres	الترايت
50	٥٠	25	٢٥	mg/L NO3	مغ/ليتر نترات	Nitrates	نترات
-	-	0.05	٠.٠٥	mg/L NH4	مغ/ليتر امونيا	Ammoniaque	امونيا
-	-	-	١	mg/L N	مغ/ل نورت	Azote Kjeldahl (NO3 excepté)	أزوت كجدال (نودون نترات)
0.05	٠.٠٥	-	-	mg/L	مغ/ليتر	Hydrocarbures dissous ou émulsionnés après extraction par ether de pétrole	هيدروكربونات ذائبة أو بعد استخلاصها بالايثير البترولي
0.001	٠.٠٠١	-	-	mg/L C6H5OH	مغ/ليتر فنول	Phénols	الفينولات

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	التوابت
-	-	0.2	٠,٢	mg/L lauryl-sulfate	لتر/لتر	Agents de surface réagissants au bleu de méthylène	العوامل السطحية المتفاعلة مع لورق الميثيلين
-	-	0.1	٠,١	mg/L	مغ/لتر	Substances extractibles au chloroforme	مواد مستخلصة بالكحول وفورم
-	-	0.1	٠,١	mg/L Fe	مغ/لتر حديد	Fer dissous	الحديد الذائب
0.3	٠,٣	0.1	٠,١	mg/L Mn	مغ/لتر مanganيز	Manganèse	مانغانيز
-	-	0.05	٠,٠٥	mg/L Cu	مغ/لتر نحاس	Cuivre	نحاس
0.05	٠,٠٥	0.02	٠,٠٢	mg/L Zn	مغ/لتر زنك	Zinc	زنك
3	٣	0.5	٠,٥	mg/L P2O5	مغ/لتر P2O5	Phosphore	فوسفور
-	-	0.4	٠,٤	mg/L F	مغ/لتر فلور	Fluor	فلور
1.5	١,٥	0.7-1	٠,٧-١	mg/L B	مغ/لتر بور	Bore	بور
-	-	1	١	mg/L Ba	مغ/لتر باريوم	Barium	باريوم
0.1	٠,١	-	-	mg/L Ba	مغ/لتر باريوم	Barium	باريوم

4. PARAMETRES CONCERNANT LES SUBSTANCES TOXIQUES ٤ - التوابت المتعلقة بالمواد السامة

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدليلية	Unité	الوحدة	Paramètres	التوابت
50	٥٠	10	١٠	µg/L As	ميكرو غرام/لتر As	Arsenic (As)	زرنيخ
5	٥	1	١	µg/L Cd	ميكرو غرام/لتر Cd	Cadmium (Cd)	كاديوم
50	٥٠	-	-	µg/L CN	ميكرو غرام/لتر CN	Cyanures (CN)	سيانيد
50	٥	-	-	µg/L Cr	ميكرو غرام/لتر Cr	Chromé total (Cr)	الكروم الكلي

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	Unité	الوحدة	Paramètres	التدابير
50	٥٠	-	-	µg/L Pb	ميكرو غرام/ليتر	Plomb (Pb)	الرصاص
1	1	0.5	٠,٥	µg/L Hg	ميكرو غرام/ليتر	Mercure (Hg)	زئبق
10	1٠	-	-	µg/L Se	ميكرو غرام/ليتر	Sélicium (Se)	سيلينيوم
0.2	٠,٢	-	-	µg/L	ميكرو غرام/ليتر	Hydrocarbures Polycycliques Aromatiques	الهيدروكربورات العطرية المتعددة الحلقات مجموع ٦ مواد
1	1	-	-	µg/L	ميكرو غرام/ليتر	Totalaux Parathion Pesticides Totalaux HCH dieldrine	المبيدات الزراعية مجموعة: باراثيون HCH وديلدرين

5. PARAMETRES MICROBIOLOGIQUES

٥ - ثوابت ميكروبيولوجية

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	Unité	الوحدة	Paramètres	التدابير
-	-	50	٥٠	37° C colonie/100 ml	٢٧ درجة مئوية وحدة في ١٠٠ مل	Coliformes Totalaux	مجموع القولونيات
-	-	20	٢٠	colonie/100 ml	وحدة في ١٠٠ مل	Coliformes thermotolerans	القولونيات المقاومة للحرارة
-	-	20	٢٠	colonie/100 ml	وحدة في ١٠٠ مل	Streptocoques fécaux	الستريبتوكوك الفعالية
-	-	Absence	غياب كامل	colonie/5000 ml	وحدة في ٥٠٠٠ مل	Salmonelles	سالمونيللا

ملحق رقم ٣
النوعية المطلوبة للمياه الصالحة للحياة المائية

QUALITE REQUISE DES EAUX POUR LA VIE AQUATIQUE

النوعية المطلوبة للمياه الصالحة للحياة المائية
Qualité requise des eaux pour la vie aquatique

نوعية المياه العذبة الصالحة لتربية الاسماك
Qualité des eaux douces aptes à la vie des poissons

المياه الصالحة لتربية الاسماك من فصيلة السلمون
Eaux Salmonicoles

Liste des paramètres

الثوابت

1-Température (°C)

١- الحرارة: (درجة مئوية)

أ- الحرارة التي تقاس حول نقطة نفايات حرارية (على حدود منطقة المزج). لا يجب ان تتعدى حرارة المياه الطبيعية: اكثر من:

A- La température mesurée en aval d'un point de rejet thermique (à la limite de la zone de mélange) ne doit pas dépasser la température naturelle de plus de:

الحد الأقصى	G	القيمة الدليلية
1	-	-
1,5 °C	-	-

ب- النفايات الحرارية لا يجب ان تتعدى حرارتها في منطقة دخولها على حدود منطقة المزج:

B- Le rejet thermique ne doit pas avoir pour conséquence que la température dans la zone située en aval du point de rejet thermique (à la limite de la zone de mélange) dépasse les valeurs suivantes:

الحد الأقصى	G	القيمة الدليلية
1	-	-
21,5	-	-
10	-	-

2- Oxygène dissous (mg/L O2):

٢- الاوكسجين الذائب (مغ/ل اكسجين):

الحد الأقصى	G	القيمة الدليلية
1	-	-
50% > 9	50% > 9	٥٠ بالمائة اكبر من ٩
اكثر من ٩	100% > 7	١٠٠ بالمائة اكبر من ٧

3- PH			٣- الاس الهيدروجيني
1	القيمة القصوى	G	القيمة الدليلية
6-9	٩ - ٦	-	-
4- Matières en suspension (mg/L):			٤- المواد العالقة (ملغ/ل):
1	الحد الاقصى	G	القيمة الدليلية
-	-	< 25	أقل من ٢٥
5- DBO5 (mg/L O2)			٥- الاوكسجين المطلوب بيولوجيا (مغ/ ليتر اوكسجين)
1	الحد الاقصى	G	القيمة الدليلية
-	-	< 3	اقل من ٣
6- Phosphore totale (mg/L PO4)			٦- الفوسفور الكلي: (مغ/ليتر فوسفور)
1	الحد الاقصى	G	القيمة الدليلية
0.2 mg/L PO4	٠,٢ مغ/ل PO4	-	-
7-Nitrites (mg/L NO2)			٧- النيتريت (مغ/ل نيتريت)
1	الحد الاقصى	G	القيمة الدليلية
< 0.01	اقل من ٠,٠١	< 0,01	اقل من ٠,٠١
8- Composés phénoliques (mg/L C6H5OH)			٨- المكونات الفينولية (مغ/ل فينول)

القيمة القصوى: يجب ان لا تغير من طعم الاسماك

I- Les composés phénoliques ne doivent pas être présents à des concentrations telles qu'elles altèrent la saveur du poisson.

9- Hydrocarbures d'origine pétrolière ٩- الهيدروكربونات ذات المصدر النفطي

القيمة القصوى: يجب ان لا تكون هذه المواد متواجدة بحيث:

- تكون طبقة رقيقة مرئية على سطح الماء، او طبقات كثيفة على سطح مجرى المياه او البحيرات.
- تعطي الاسماك طعم الهيدروكربونات الواضح.
- تسبب بتأثيرات ضارة على الاسماك.

I- Les produits d'origine pétrolière ne doivent pas être présents dans les eaux en quantités telle

- qu'ils forment un film visible à la surface de l'eau ou qu'ils se déposent en couches sur le lit des cours d'eau et des lacs.
- qu'ils communiquent aux poissons une saveur perceptible d'hydrocarbures.
- qu'ils provoquent des effets nocifs chez les poissons.

10- Ammoniac non-ionisé (mg/L NH ₃)	الحد الأقصى	G	١٠- الامونياك غير المؤين (ملغ / ل NH ₃):
1	أقل من	< 0.005	القيمة الدليّة
< 0.025	٠,٠٢٥		أقل من ٠,٠٠٥
11- Ammonium total (mg/L NH ₄)	الحد الأقصى	G	١١- الامونياك الكلي (ملغ / ل NH ₄):
1	أقل من ١	< 0.04	القيمة الدليّة
< 1			أقل من ٠,٠٤
12- Chlore résiduel total (mg/L HOCL)	الحد الأقصى	G	١٢- الكلور المتبقي الكلي (ملغ / ل HOCL)
1	أقل من	-	القيمة الدليّة
< 0.005	٠,٠٠٥		-
13- Zinc total (mg/L Zinc)	الحد الأقصى	G	١٣- الزنك الكلي: (ملغ / ل زنك)
1	أقل من ٠,٣	-	القيمة الدليّة
< 0.3			-
14- Cuivre soluble (mg/L Cu)	الحد الأقصى	G	١٤- النحاس الكلي الذائب (ملغ / ل نحاس)
1	أقل من ٠,٠٤	-	القيمة الدليّة
< 0.04			-

ملحق رقم ٤
مواصفات المياه الصالحة للسباحة:
أحواض ، التهاز ، بحيرات وبحار
EXIGENCES DE QUALITE DES EAUX DE BAIGNADE:
RIVIERES, LACS ET MERS

مواصفات مياه أحواض السباحة

Exigences de qualité des eaux de baignade: Piscines

الشفافية: أن تسمح بوضوح جسم ضلعه ٣٠ سنتم موجود في النقطة الأكثر عمقا في الحوض.

Transparence: Permet de voir parfaitement au fond du bassin les lignes de nage ou un repère sombre de 0.3m de côté placé au point le plus profond.

نسبة التعتيشية: أن لا تكون المياه محترقة للعيون والجلد والانسجة المخاطية.

Taux d'irritation: Non irritante pour les yeux, la peau et les muqueuses

الحد الأقصى المقبول	القيمة الدنيا	Niveau guide	الوحدة	الوحدة	المعيار	الوحدات
4	-	-	mg/L O2	مغ/ل اوكسجين	Matière oxydable au KM nO4 à chaud	المسوكسجدة بواسطة البرمنجات في وسط قلوي ساخن
6.9-8.2	-	-	Unité PH	وحدة الاس الهيدروجيني	PH	الاس الهيدروجيني
< 100	< 100	-	Colonic/100 mL à 37° C	وحدة/100 مل على ٣٧ درجة مئوية	Bactéries aérobies revivifiables	عدد البكتيريا الهوائية على ٣٧ درجة مئوية
< 10	< 10	-	Colonic/100 mL	وحدة في 100 مل	Coliformes totaux	عدد القولونيات المجموعة
0*	صفر*	-	Colonic/100 mL	وحدة في 100 مل	Coliformes fécaux	الكوليفورم المخاطية
0*	صفر*	-	Colonic/100 mL	وحدة في 100 مل	Staphylocoques pathogenes	الستافيلوكوك المرضية

* ملاحظة: الصفر عائد الى ٩٠ بالمائة من العينات المدروسة.

مواصفات المياه الصالحة للسباحة: النهار، بحيرات، بحار
Exigences de qualité des eaux de baignade: mer, rivières et lacs

1- Paramètres microbiologiques

الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	الوحدة	البارامترات	الثوابت
10000	500	٥٠٠	وحدة في ١٠٠ مل	Coliformes totaux	مجموعة التوربينات في ١٠٠ مل
2000	100	١٠٠	وحدة في ١٠٠ مل	Coliformes thermotolerants	التوربينات المقاومة للحرارة
-	100	١٠٠	وحدة في ١٠٠ مل	Streptocoques fécaux	المستربوتوك الناعمة
-	0	صفر	وحدة في اللتر الواحد	Salmonelles	سالمونيلا
-	0	صفر	وحدة في المتر لترات	Enterovirus	التوروسات المعوية

٢ - الثوابت الفيزيوكيميائية

الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	الوحدة	البارامترات	الثوابت
6-9	٩-٦	بدون تغيرات اللون	وحدة الامن الهيدروجيني	pH	الامن الهيدروجيني
				Couleur	اللون
				Huiles minérales	الزيوت المعدنية
Pas de film à la surface et absence d'odeur	لا يوجد طبقة مرئية على سطح الماء ولا رائحة خاصة	≤ ٠,٣	مغ/ل		

١ - ثوابت ميكروبيولوجية

Valeur maximale admissible	الحد الأقصى المقبول	Niveau guide	القيمة الدلالية	Unité	الوحدة	Paramètres	الترايب
Pas de mousse persistante	عدم وجود رغوة مستمرة	< 0.3	٢,٠٣ ≤	mg/L lauryl sulphate	مع/ل لوريل سلفات	Substances tensioactives réagissant au bleu de méthylène	عوامل سطحية متفاعلة مع أزرق الميثيلين
	-	80-120	٨٠ - ١٢٠	Saturation en oxygène	نسبة التبع بالأكسجين	Oxygène dissous	الأكسجين الذائب
		Absence	الغياب الكامل			Résidus goudronneux et matières flottantes	بقايا قطنية ورواح عالمة

ملحق رقم ٥
مواصفات المياه المبتلاة الحضرية

CARACTERISTIQUES DES EAUX URBAINES RESIDUAIRES

التلوث اليومي لكل فرد

Pollution journalière par habitant

كمية التلوث اليومي التي ينبغي ان تؤخذ بالحسبان لكل فرد:

- مواد عالقة : ٩٠ غ
- Matières en suspension : 90 g :
- مواد موكدة : ٥٧ غ
- Matières oxydables : 57 g :
- آزوت عضوي وأموني : ١٥ غ
- Azote organique et ammonical : 15 g :
- فوسفور كلي : ٤ غ
- Phosphore total : 4 g :

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

مميزات المياه المبتذلة الحضرية (قبل المعالجة)

Caractéristiques de l'eau usée urbaine (avant traitement)

(عينة متوسطة على ٢٤ ساعة - ترسيب مسبق لمدة ساعتين)

(Echantillon moyen 24h, décantation préalable de 2 h)

< ٢,٥	:	معدل الأوكسجين المستهلك كيميائيا على	-
< 2.5	:	معدل الأوكسجين الحيوي المتخصص	DCO/DBO5
< ٧٥٠ ملغ/ل	:	معدل الأوكسجين المستهلك كيميائيا	-
< 750 mg/L	:	معدل الأوكسجين المستهلك كيميائيا	DCO
< ١٠٠ ملغ/ل	:	أزوت كجلال	-
< 100 mg/L	:	أزوت Kjeldahl	Azote Kjeldahl

المميزات المطلوبة لمياه الصرف المعالجة، مهما كان مستوى المعالجة

Caractéristiques de l'effluent traité exigibles quel que soit le niveau de traitement

مياه احواض السباحة Eaux de Baignade	المياه المعدة لإنتاج المياه الغذائية Eaux destinées à la production d'eau alimentaire	المغذيات Eaux Salmicoles	حالة عامة Cas Général	الرفع الأقصى للحرارة (درجة مئوية) Elevation maximale de température (°C)	على حدود منطقة الخط A la limite de la zone de mélange
-	-	١,٥	متلائم مع بيوت المنقطة Compatible avec les vocations du milieu	الحرارة القصوى (درجة مئوية) Température maximale (°C)	على بعد ٥٠ مترا من منطقة الصرف
-	٢,٥	٢١,٥	-	الحرارة القصوى (درجة مئوية) Température maximale (°C)	على بعد ٥٠ مترا من منطقة الصرف
٩-٦	١,٥-٢,٥	٢١,٥	١-٥,٥	الحرارة القصوى (درجة مئوية) Température maximale (°C)	على بعد ٥٠ مترا من منطقة الصرف
٦-٩	٦,٥-٨,٥	٦-٩	٥,٥-٩	الحرارة القصوى (درجة مئوية) Température maximale (°C)	على بعد ٥٠ مترا من منطقة الصرف

عينة متوسطة على ساعتين غير منزّية	Echantillon moyen sur 2 h non décanté
عينة متوسطة على أربع وعشرين ساعة غير منزّية	Echantillon moyen sur vingt-quatre heures non décanté

2- Niveaux de rejet pour les substances azotées et phosphorées

٢ - مستويات الصرف بعد المعالجة لأشكال الأروثية و الفوسفورية

النسبة المئوية الدنيا للتخفيض المستوي مقارنة بقطر عند الدخول	Concentration	التركيز	Paramètres	النواتج
80	2 mg/L (Equivalent habitant entre 10000 et 100000) 1mg/L (Equivalent habitant de plus de 100000)	٢ ملغ/ل معدل سكني بين ١٠٠٠٠٠ و ١٠٠٠٠٠٠ ١ ملغ/ل معدل سكني يتجاوز الـ ١٠٠٠٠٠٠	Phosphore total	الفوسفور الكلي
70 - 80	15 mg/L (Equivalent habitant entre 10000 et 100000) 10 mg/L (Equivalent habitant de plus de 100000)	١٥ ملغ/ل معدل سكني بين ١٠٠٠٠٠٠ و ١٠٠٠٠٠٠٠ ١٠ ملغ/ل معدل سكني يتجاوز الـ ١٠٠٠٠٠٠	Azote total	أزوت كلي

ملحق رقم ٧
المواصفات المسموح بها لتصريف أو طمر نفايات سائلة أو صلبة في المياه السطحية،
الجوفية ومياه البحر داخل الحدود الدولية
(نفايات لا يعتد بضررها)

AUTORISATION DES DEVERSEMENTS, ECOULEMENTS JETS,
DEPOTS ET AUTRES FAITS SUSCEPTIBLES D'ALTERER
LA QUALITE DES EAUX SUPERFICIELLES, SOUTERRAINES
ET DE LA MER DANS LES LIMITES TERRITORIALES
(REJETS ET DEPOTS DE NOCIVITE NEGLIGEABLE)

Enfouissement الطمر	Epandages نشر النفايات سطحا	Rejets en mer التصريف في مياه البحر	Rejets dans les canaux, lacs et étangs التصريف في مياه الاقنية، البحيرات والمستنقعات	Rejets dans les cours d'eau التصريف في مياه الانهر	Conditions الشروط الواجب تطبيقها
150 ١٥٠	500 ٥٠٠	500 ٥٠٠	500 ٥٠٠	500 ٥٠٠	Flux maximal de pollution en habitants réels ou équivalents التدفق الأقصى للثوث والمعبر عنه بعدد السكان الحقيقي أو المعادل له
30 ٣٠	100 ١٠٠	100 ١٠٠	10 ١٠	100 ١٠٠	En grammes par jour d'hydrocarbures غرام باليوم من الهيدروكربورات
5 ٥	10 ١٠	10 ١٠	1 ١	10 ١٠	En grammes par jour de composés cycliques hydroxylés غرام باليوم من المسواد الدوريسية الهيدروكسيلية

Enfouissement الطمر	Epanchages تنثر النفايات سطوحيا	Rejets en mer التصريف في مياه البحر	Rejets dans les التصريف في مياه الأقبية، البحيرات والمستنقعات	Rejets dans les cours d'eau التصريف في مياه الأهدر	Conditions الشروط الواجب تطبيقها
100	300	-	30	300	En kilogrammes par jour de sels dissous كلو غرام باليوم من الأملاح الذائبة
١٠٠	٣٠٠	-	٣٠	٣٠٠	
-	-	-	500	-	En azote et phosphore totaux (g/jour) النيتروجين و الفوسفور الكليان (غرام/اليوم)
-	-	-	٥٠٠	-	
-	300	-	-	-	En azote phosphore totaux (Kg/ha/an) النيتروجين و الفوسفور الكليان
-	٣٠٠	-	-	-	
non décelables par voic biologique غير محسوس بها	non décelables par voic biologique غير محسوس بها	non décelables par voic biologique غير محسوس بها	non décelables par voie biologique غير محسوس بها بيولوجيا	non décelables par voie biologique غير محسوس بها بيولوجيا	Substances inhibitrices المواد الضارة للنمو
بيولوجيا	بيولوجيا	بيولوجيا	بيولوجيا	بيولوجيا	

ملحق رقم ٨

المواصفات لبعض المواد الضارة عند صرفها في البيئة البحرية داخل الحدود الدولية
(نفايات سائلة غير منزلية)

مسافة تتجاوز ال ٥٠٠ متر على الشاطئ

autres que les eaux urbaines residuaires dans les Paramètres concernant les rejets
eaux de mer dans les limites territoriales
(rejets à une distance supérieure à 500 mètres de la côté)

التوابت	Paramètres	الوحدة	Unité	القيمة القصوى	Valeur maximale
درجة الحرارة	Température	درجة مئوية	°Celsius	٣٥	35
الاس الهيدروجيني	pH	وحدة الاس الهيدروجيني	Unités pH	٦-٩	6-9
اللون	Couleur			خالية من المواد الملوثة	Absence de
الاوكسجين الحيوي الممتص	DBO5	ملغ اوكسجين في اللتر	mg O2/L	٦٠	60
الاوكسجين المستهلك كيميائيا	DCO	ملغ اوكسجين في اللتر	mg O2/L	١٠٠	100
مواد صلبة ذائبة	Matières solides dissoutes	ملغ/لتر	mg/L	٢٠٠	200
بقايا المواد الصلبة الذائبة بعد تبخيرها على ١٥٠ درجة	Résidu sec à 150 °C	ملغ/لتر	mg/L	١٨٠٠	1800
المواد العالقة	Matières en suspension	ملغ/لتر	mg/L	٦٠	60
العكارة	Turbidité	NTU	NTU	٥٠	50
السولفيدات	Sulfures	ملغ/لتر	mg/L	١	1
شحوم وزيوت	Huiles et Graisses	ملغ/لتر	mg/L	١٥	15
هيدروكربورات من اصل بترولي	Hydrocarbures d'origine pétrolière	ملغ/لتر	mg/L	٠,٥	0.5
فوسفات	Phosphates PO4	ملغ/لتر	mg/L	٥	5
نترات	Nitrates NO3-	ملغ/لتر	mg/L	٤٠	40

الثوابت	Paramètres	الوحدة	Unité	القيمة القصوى	Valeur maximale
فينولات	Phénols	ملغ/ليتر	mg/L	١	1
الفلوريدات	Fluorures	ملغ/ليتر	mg/L	١,٥	1.5
الالومينيوم	Aluminium	ملغ/ليتر	mg/L	٣	3
الامونيوم	Ammonium NH4+	ملغ/ليتر	mg/L	٣	3
الزئبق	Mercure	ملغ/ليتر	mg/L	٠,٠٠٥	0.005
الرصاص	Plomb	ملغ/ليتر	mg/L	٠,٥	0.5
الكاديوم	Cadmium	ملغ/ليتر	mg/L	٠,٠٥	0.05
الزرنيخ	Arsenic	ملغ/ليتر	mg/L	٠,٠٥	0.05
الكروميوم الكلي	Chrome total	ملغ/ليتر	mg/L	١	1
النحاس	Cuivre	ملغ/ليتر	mg/L	١,٥	1.5
النيكل	Nickel	ملغ/ليتر	mg/L	٠,١	0.1
الحديد	Fer	ملغ/ليتر	mg/L	١,٥	1.5
المنغنيز	Manganese	ملغ/ليتر	mg/L	١	1
الزنك	Zinc	ملغ/ليتر	mg/L	٥	5
الفضة	Argent	ملغ/ليتر	mg/L	٠,١	0.1
الباريوم	Barium	ملغ/ليتر	mg/L	٢	2
الكوبالت	Cobalt	ملغ/ليتر	mg/L	٢	2
المبيدات بمختلف أنواعها	Pesticides totaux	ملغ/ليتر	mg/L	٠,٢	0.2
السيانيدات	Cyanures	ملغ/ليتر	mg/L	٠,١	0.1
مجموع التلوثيات	Coliformes totaux	عدد في ١٠٠ مليلتر	Colonies/100mL	٥٠٠٠	5000

ملحق رقم ٩

الحدود القصوى لملوثات الهواء في أماكن العمل

Valeurs Limites d'Exposition dans les milieux de travail

ملاحظات

- ١- المتوسط الزمني: هو المتوسط الزمني ليوم عمل عادي (٨ ساعات) والتي يمكن ان يتعرض له العامل بمعدل ٥ أيام في الاسبوع طوال فترة عمله دون حدوث اضرار صحية.
- ٢- حدود التعرض لفترة قصيرة: وهي الحدود التي يمكن ان يتعرض لها العامل باستمرار لفترة قصيرة لا تتجاوز الـ ١٥ دقيقة. ولا يجوز ان يتكرر هذا التعرض اكثر من ٤ مرات في اليوم الواحد ويجب ان تكون الفترة بين كل تعرض قصير والذي يليه ٦٠ دقيقة على الأقل.

- ٣- الحد السقيفي: هو الحد الذي لا يجوز تجاوزه ولو للحظة.
- ٤- عندما يكون الامتصاص عن طريق الجلد عاملا في زيادة التعرض توضع اشارة (+ جلد) امام حد التعرض لفترة قصيرة.

- A-

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
م Ca	٢٧٠ 270	١٥ 15	١٨٠ 180	١٠٠ 100	اسيتالدهايد Acétaldéhyde
	٣٧ 37	١٠ 10	٢٥ 25	١٠ 10	حامض الخليك Acide Acétique
	٢٤٠٠ 2400	١٠٠٠ 1000	١٨٠٠ 1800	٧٥٠ 750	اسيتون Acetone
ج P	١٠٥ 105	٦٠ 60	٧٠ 70	٤٠ 40	استيونيتريل Acétonitrile
			١٤ 14	١ 1	رباعي برومايد الاستلين tetra bromure d'Acétylène
ج P	٠,٨ 0.8	٠,٣ 0.3	٠,٢٥ 0.25	٠,١ 0.1	اكرولين Acroléine
ج P			٠,٠٣ 0.03		اكريل اميد Acrylamide
ج P		١٠ 10		٢ 2	اكريلونتريل Acrylonitrile
ج P			٠,٢٥ 0.25		الدرين Aldrine
	١٠ 10	٤ 4	٥ 5	٢ 2	الكحول الايلي Chlorure Allylique
	٦ 6	٢ 2	٣ 3	١ 1	كلوريد الايل Chlorure d'Allyle
			٢ 2	٠,٥ 0.5	امينوبيريدين 2- Amino pyridine
	٢٧ 27	٣٥ 35	١٨ 18	٢٥ 25	امونيا Ammonia
			٥٢٥ 525	١٠٠ 100	ن - خلات الاميل n- amyl acétate

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد، Pc: Peau

ملاحظات * Notes		حدود التعرض لمدة قصيرة		المتوسط الزمني		المادة Substance
		Valeur Moyenne pour une courte durée d'exposition		Valeur Moyenne		
		مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
				٦٥٠ 650	١٢٥ 125	ثانوي خلات الاميل Sec-Amyl acétate
ع P	م Ca			٨ 8	٢ 2	انيلين ومثيلاته Aniline et homologues
				٠,٥ 0.5		الانثيمون ومركباته Antimoine et dérivés
				٠,٣ 0.3		انترو ANTU
				٠,٠١		الزرنبيخ ومركباته القابلة للذوبان Arsenic et dérivés solubles
				٠,٢ 0.2	٠,٠٥ 0.5	غاز الارسين Arsine
				٠,٢ 0.2		ازينفوس - ميثيل Azinphos-Methyl
				٠,٥ 0.5		باريوم ومركباته القابلة للذوبان Baryum et dérivés solubles
م Ca		١٦,٢٥ 16.25	٥ 5	٣,٢٥ 3.25	١ 1	بنزين Benzène C6H6
			٥ 5		١ 1	كلوريد البنزيل Chlorure de benzyl
				٠,٠٠٢ 0.002		البريليوم ومشتقاته ك بريليوم Beryllium et dérivés
				١,٠ 1.0	٠,٢ 0.2	ثنائي الفينيل Biphényl
		٠,٠٣ 0.03	٠,٠١٥ 0.015	٠,٠١ 0.01	٠,٠٠٥ 0.005	بورون خماسي الهيدرات Pentaborane
				٣ 3	١ 1	ثالث فلوريد البورون Trifluorure de Bore

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد، Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
	٢ 2	٠,٣ 0.3	٠,٧ 0.7	٠,١ 0.1	البروم Brome
ج P			٥ 5	٠,٥ 0.5	بروفورم Bromoforme
م Ca			٢٢٠٠ 2200	١٠٠٠ 1000	٣,١ - بيوتادين 1.3 - butadiène
	٩٥٠ 950	٢٠٠ 200	٧١٠ 710	١٥٠ 150	ن - خلات البيوتيل n-butyl Acétate
	١١٩٠ 1190	٢٥٠ 250	٩٥٠ 950	٢٠٠ 200	ثنائي خلات البيوتيل Sec-butyl Acétate
	١١٩٠ 1190	٢٥٠ 250	٩٥٠ 950	٢٠٠ 200	ثلاثي خلات البيوتيل Tert-butyl Acétate
ج P			١٥٠ 150	٥٠ 50	ن - كحول بيوتيل Alcool-n-butylrique
	٤٥٥ 455	١٥٠ 150	٣٠٥ 305	١٠٠ 100	ثنائي كحول بيوتيلي Alcool Sec butylique
	٤٥٠ 450	١٥٠ 150	٣٠٠ 300	١٠٠ 100	ثلاثي كحول بيوتيلي Alcool Ter butylique
ج P			١٠ 10	٥ 5	بيوتيل امين Butyl amine
ج P Ca			٠,١ 0.1		ثلاثي بيوتيل كرومات CrO3 Tert-butyl chromate
			١,٥ 1.5	٠,٥ 0.5	لبنات البيوتيل n.butyl glycidyl ether
			١٣٥ 135	٢٥ 25	بيوتيل مركبتان Butyl mercaptan
م Ca			٠,٢ 0.2		غبار الكاديوم Cadmium (Poussières)

*م: مسرطن، Ca : Cancérogène، ج: تتسرب من خلال الجلد :Pc

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			٠,١ 0.1		ادخنة الكاديوم Cadmium (fumées)
			٢ 2		أكسيد الكالسيوم Oxyde de calcium
			٥ 5		كرباريل Carbaryl (sevin)
			٣,٥ 3.5		الكربون الاسود Noir de charbon
	٤٥٠٠٠ 45000	٣٠٠٠٠ 30000	٩٠٠٠ 9000	٥٠٠٠ 5000	ثاني اكسيد الكربون Dioxyde de carbone
ج p	٣٦ 36	١٢ 12	١٢ 12	٤ 4	ثاني كبريتور الكربون Bisulphure de carbone CS2
	٢٢٩ 229	٢٠٠ 200	٤٠ 40	٣٥ 35	أول أكسيد الكربون Monoxyde de carbone
م Ca	١٢,٥ 12.5	٢ 2			رابع كلوريد الكربون Tetrachlorure de carbone CCL4
ج p Ca			٠,٥ 0.5		كلوردان Chlordane
ج p Ca	١ 1		٠,٥ 0.5		الكامفين المكلور Chloro camphène
ج p Ca	١ 1		٠,٥ 0.5		اكسيد ثنائي الفنيل المكلور Oxyde de biphenyl chloré
	٣ 3	١ 1	١,٥ 1.5	٠,٥ 0.5	كلور Chlore
	٠,٩ 0.9	٠,٣ 0.3	٠,٣ 0.3	٠,١ 0.1	ثاني اكسيد الكلور Dioxyde de chlore
			٣ حد أقصى 3	١ حد أقصى 1	كلورو استالدهيد Chloro acetaldehyde

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد :Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			٣٥٠ 350	٧٥ 75	كلورو بنزين Chlorobenzène
ج م P Ca			١ 1		كلورو دايفينيل (٤٢٪ كلور) Chlorobiphenyl (42% Chlore)
م Ca			٩,٨٧ 9.87	٢ 2	كلوروفورم Chloroforme
م Ca			٠,٠٠٥ 0.005	٠,٠٠١ 0.001	كلوروميثيل ايثير Chloro methyl methyl ether
			٠,٧ 0.7	٠,١ 0.1	كلوروبيكرين Chloropicrine
			٠,٥ 0.5		الكروم ومركباته (معادن الكروم) Chrome et dérivés
م Ca			٠,٠٠١ 0.001		مركبات الكروم السداسية التكافؤ Chrome hexavalent (Cr)
			٠,٥ 0.5		مركبات الكروم الثنائية والثلاثية التكافؤ Chrome (II) & (III) bivalents et trivalents
م Ca			٠,٢ 0.2		مركبات قطران الفحم القابلة للتطاير والذوبان في البنزين Goudrons volatils et solubles dans le benzène
			٠,٠١٥ 0.05		كوبالت أغبرة وادخنه Cobalt (Poussières et fumées)
			١ 1		نحاس ورذاذ اغبرته Cuivre (Poussières et aérosols)
			٠,١ 0.1		نحاس وادخنه cuivre (Fumées)
			٠,٢ 0.2		غبار القطن الخام Coton brut (Poussières)

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد: Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
ج P			٢٢ 22	٥ 5	الكريزولات Crésols
ج P			٢٤٥ 245	٥٠ 50	كومين Cumène
			٥ 5		أملاح السيانيد (محسوبة كسيانيد) Sels de cyanures
			١٠٥٠ 1050	٣٠٠ 300	الهكسان الدوري Cyclohexane
			٢٠٠ 200	٧٥ 75	سيكلوبنتادين Cyclopentadiène
	٢٥٨٠ 2580	٩٠٠ 900	١٧٢٠ 1720	٦٠٠ 600	البنطاره الدوري Cyclopentane
م Ca			١ 1		د.د.ت D.D.T
ج P	٠,٩ 0.9	٠,١٥ 0.15	٠,٣ 0.3	٠,٠٥ 0.05	ديكابورين Decaborane
ج P	٠,٣ 0.3		٠,١ 0.1		ديازينون Diazinon
			٠,٤ 0.4	٠,٢ 0.2	ثنائي ازوميثان Diazométhane
			٠,١ 0.1	٠,١ 0.1	دايبورين Diborane
			٥ 5		ثنائي بيوتيل فتالات Dibutyl phthalate
			٣٠٠ كحد أقصى 300	٥٠ 50	اورثو داكلورو بنزين O - dichlorobenzène
م Ca	٦٧٥ 675	١١٠ 110	٤٥٠ 450	٧٥ 75	بارا داكلورو بنزين P- dichlorobenzène

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد، Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			٧٩٠ 790	٢٠٠ 200	٢,١ - داي كلورو ايثيلين 1,2- Dichloroéthylène
م ج p Ca	٦٠ 60	١٠ 10	٣٠ 30	٥ 5	داي كلورو ايثيل اثير Dichloro ethyl ether
ج. p			١ 1		داي كلورفوس Dichlorvos
م ج p Ca			٠,٢٥ 0.25		ديلدرين Dieldrine
ج p	٥٠ 50	١٠ 10	٢٥ 25	٥ 5	داي ميثيل انيلين Diméthylaniline
ج p			١ 1		ثنائي نيتروبنزين Dinitrobenzène
ج p			٠,٢ 0.2		ثنائي نيترو اورتو كريسول Dinitro orthocrésol
م ج p Ca			١,٥ 1.5		ثنائي نيتروتولوين Dinitrotoluène
ج p			٩٠ 90	٢٥ 25	ديوكسان Dioxane
ج p	٩٠٠ 900	١٥٠ 150	٦٠٠ 600	١٠٠ 100	داي بروبيلين جليكول (ميثيل اثير) Dipropylène glycol
ج p			٠,١ 0.1		اندرين Endrine
م ج p Ca			٨ 8	٢ 2	ايبكلور هيدرين Epichlorhydrine
ج p			٧٤٠ 740	٢٠٠ 200	٢ - ايتوكسي ايثانول 2- Ethoxyéthanol

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد، Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة		المتوسط الزمني		المادة Substance
	Valeur Moyenne pour une courte durée d'exposition		Valeur Moyenne		
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			١٤٠٠ 1400	٤٠٠ 400	خلات الاثيل Ethyl acétate
م ج p Ca	١٠٠ 100	٢٥ 25	٢٠ 20	٥ 5	ايثيل اكريلات Ethyl acrylate
	١١١٠ 1110	٢٥٠ 250	٨٩٠ 890	٢٠٠ 200	ايثيل برومايد Ethyl bromure
	١٥ 15	٦ 6	٨ 8	٣ 3	ايثانول امين Ethanolamine
	٥٤٥ 545	١٢٥ 125	٤٣٥ 435	١٠٠ 100	ايثيل بنزين Ethyl benzene
			٢٣٠ 230	٥٠ 50	ايثيل بيوتيل كيتون Ethyl butyl cétone
			٢٦٠٠ 2600	١٠٠٠ 1000	كلوريد الاثير Ethyl Chlorure
			٢٥ 25	١٠ 10	ايثيل داي امين Ethyl diamine
م Ca	٩,١٥ 9.15	٥ 5	١,٨٣ 1.83	١ 1	اكسيد الاثيلين Oxyde d'ethylène
م Ca	٨ 8	٢ 2	٤ 4	١ 1	٢,١ - داي كلوروايثان 1,2 - Dichloroethane
	١٥٠٠ 1500	٥٠٠ 500	١٢٠٠ 1200	٤٠٠ 400	ايثيل ايثر Ether Ethylique
			١ 1	٠,٥ 0.5	ايثيل مركبتان Ethyl mercaptan

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
	٣ 3		١ 1		غبار الفاناديوم الحديدي Ferro vanadium Poussières
			٢,٥ 2.5		الفلوريدات (S فلور) Florures (F)
			٠,٢ 0.2	٠,١ 0.1	الفلور Fluor
م Ca		٢ 2		١ 1	فورما لدهيد Formaldehyde
			٩ 9	٥ 5	حامض الفورميك Acide Formique
ج م p Ca			٠,٥ 0.5		هبتاكلور Heptachlore
	٢٠٠٠ 2000	٥٠٠ 500	١٦٠٠ 1600	٤٠٠ 400	ن - هبتان n- Heptane
			١٨٠ 180	٥٠ 50	ن - هكسان n- Hexane
			٢٠ 20	٥ 5	٢- هكساتون 2- Hexanone
ج م p Ca			٠,١ 0.1	٠,١ 0.1	هيدرازين Hydrazine
			١٠ 10	٣ 3	بروميد الهيدروجين Bromure d'hydrogène
ج P.	٥ 5	٤,٧ 4.7			سيانيد الهيدروجين Cyanure d'hydrogène
حد سقني			٧ 7	٥ 5	كلوريد الهيدروجين Acide Chlorhydrique
		٦ 6		٣ 3	فلوريد الهيدروجين Acide fluorhydrique

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			١,٤ 1.4	١ 1	بيروكسيد الهيدروجين Peroxyde d'hydrogène
			٠,٢ 0.2	٠,٠٥ 0.05	سلينيد الهيدروجين Hydrogène selenié
	٢١ 21	١٥ 15	١٤ 14	١٠ 10	كبريتيد الهيدروجين Sulfure d'hydrogène
حد سقفي			١ 1	٠,١ 0.1	اليود Iode
			١٠ 10		ادخنة اكسيد الحديد Oxyde de fer (fumées)
			٥٢٥ 525	١٠٠ 100	ايزواميل اسيتات Isoamyl acétate
	٤٥٠ 450	١٢٥ 125	٣٦٠ 360	١٠٠ 100	الكحول الايزواميلي Alcool isoamylique
			٧٠٠ 700	١٥٠ 150	ايزوبوتيل اسيتات Isbutyl Acétate
			١٥٠ 150	٥٠ 50	الكحول الايزوبوتيلي Alcool isobutylique
	١١٨٥ 1185	٣١٠ 310	٩٥٠ 950	٢٥٠ 250	ايزوبوتيل اسيتات Isopropyl Acétate
	١٢٢٥ 1225	٥٠٠ 500	٩٨٠ 980	٤٠٠ 400	الكحول الايزوبروبيلي Alcool isopropylique
			٠,٠٥ 0.05		اغبرة وادخنة الرصاص غير العضوي Pb minéral (Poussières et fumées)
ج P			١٨٠٠ 1800	١٠٠٠ 1000	لندان Lindane
			١٨٠٠ 1800	١٠٠٠ 1000	الغازات البترولية السائلة Gaz liquéfiés d'origine pétrolière

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			١٠ 10		ادخنة اكاسيد المغنسيوم Oxyde de magnesium (fumées)
			١٠ 10		ملاثيون Malathion
			٥ 5		اتربة ومركبات المنجنيز Manganèse
ج P			٠,٠٥ 0.05		الزئبق كبخار Mercure (Vapeur)
ج P	٠,٠٣ 0.03		٠,٠١ 0.01		الزئبق كمركبات عضورية الكيلتة Mercure organique (Alkyls)
م Ca			١٠ 10		ميثوكسيلور Methoxychlore
ج P	٢٢٥ 325	٢٥٠ 250	٢٦٠ 260	٢٠٠ 200	الكحول الميثيلي Alcool méthylique
ج P			٣٥ 35	١٠ 10	ميثيل اكريلات Methyl acrylate
ج م P Ca			٢٠ 20	٥ 5	بروميد الميثيل Bromure de méthyl
م Ca	٢١٠ 210	١٠٠ 100	١٠٥ 105	٥٠ 50	ميثيل كلورايد Chlorure de méthyl
	٢٤٥٠ 2450	٤٥٠ 450	١٩٠٠ 1900	٣٥٠ 350	ميثيل كلوروفورم Methyl Chloroforme
حد سقفي			٠,٢ 0.2	٠,٠٢ 0.02	ميثيلين ثنائي فينيل ايزوسيانات MDI
م Ca	١٠٠٠ حد 1000 سقفي			٥٠٠ 500	ميثيلين كلورايد Chlorure de méthylène
ج م P Ca			٠,٣٥ حد سقفي 0.35	٠,٢ 0.2	ميثيل هيدرازين Methyl Hydrazine

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
ج P			٠,٠٥ 0.05	٠,٢ 0.2	ميثيل ايزوسيانات Methyl Isocyanate
			١ 1	٠,٥ 0.5	ميثيل مركبتان Methyl Mercaptan
ج P	٠,٦ 0.6		٠,٢ 0.2		بارانيون ميثيل Parathion methyl
ج P	٠,٣ 0.3	٠,٠٣ 0.03	٠,١ 0.1	٠,٠١ 0.01	مفينفوس Mevinphos, phosolvin
	٧٥ 75	١٥ 15	٥٠ 50	١٠ 10	نفتالين Naphthaline
			٠,٠٠٧ 0.007	٠,٠٠١ 0.001	كربونيل النيكل Nickel carbonyle
			١ 1		النيكل: معدن Nickel (métal)
	٠,٣ 0.3		٠,١ 0.1		مركبات قابلة للذوبان Nickel: dérivés solubles
ج P			٠,٥ 0.5		نيكوتين Nicotine
	١٠ 10	٤ 4	٥ 5	٢ 2	حمض النتريك Acide nitrique
			٣٠ 30	٢٥ 25	اكسيد النتريك Oxyde nitrique
ج P			٣ 3		ب - نيترو انيلين P- Nitroaniline
			٥ 5	١ 1	نيترو بنزين Nitro benzène
ج P			١ 1		ب - نيترو كلوروبنزين P- Nitrochlorobenzène

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
	١,٨ 1.8	١ 1			ثاني اوكسيد النيتروجين Dioxyde d'Azote
			٣٠ 30	١٠ 10	ثالث فلوريد النتروجين NF3 Trifluorure d'azote
ج p	٠,١ 0.1				نيترو جليسرين Nitroglycérine
ج p			١١ 11	٢ 2	نيتروتولوين Nitrotoluène
ج p	٠,٣ 0.3		٠,١ 0.1		اوكتاكلورو نفتالين Octa chloro naphthalène
	١٠ 10		٥ 5		رذاذ الزيوت المعدنية Huile minérale
	٠,٠٠٠٦ 0.0006	٠,٠٠٦ 0.006	٠,٠٠٠٢ 0.0002	٠,٠٠٢ 0.002	رابع اوكسيد الاوسميوم OsO4 Tetraoxyde d'osmium
	٢ 2		١ 1		حمض الاوكساليك Acide oxalique
			٠,١ 0.1	٠,٠٥ 0.05	ثاني اوكسيد الاوكسيجين OF2 bifluorure d'oxygène
	٠,٦ 0.6	٠,٣ 0.3	٠,٢ 0.2	٠,١ 0.1	اوزون Ozone
ج p			٠,١ 0.1		براكوات Paraquat
ج p			٠,١ 0.1		باراثيون Parathion
ج p			٠,٥ 0.5		خماسي كلور النفثالين Pentachloronaphthalène
ج p			٠,٥ 0.5		خماسي كلور الفينول Pentachlorophénol

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
			٧٩٠ 790	٢٠٠ 200	٢,١ - ثنائي كلور الاثيلين 1,2 dichloroéthylène
ج p	٦٠ 60	١٥,٦ 15.6	١٩ 19	٥ 5	فينول Phénol
ج p			٠,١ 0.1		بار افينيلين داي امين P- Phénylène diamine
ج م p Ca	٤٥ 45	١٠ 10	٢٠ 20	٥ 5	فينيل هيدرازين Phenyl hydrazine
	٠,٨ 0.8	٠,٢ 0.2	٠,٤ 0.4	٠,١ 0.1	فوسجين Phosgène
	١ 1	١ 1	٠,٤ 0.4	٠,٣ 0.3	فوسفين Phosphine
	٣ 3		١ 1		حامض فوسفوريك Acide phosphorique
			٠,١ 0.1		الفوسفور الاصفر Phosphore Jaune
ج p			٠,١ 0.1		حامض البكريك Acide picrique
			٠,٠٠٢ 0.002		املاح البلاتين القابلة للذوبان Platine: dérivés solubles
ج p	٦٢٥ 625	٢٥٠ 250	٥٠٠ 500	٢٠٠ 200	الكحول البروبيلي Alcool propylique
			٥ 5		بيريتروم Pyréthrine
			١٥ 15	٥ 5	بيريدين Pyridine
			١٠ كلي 10 total		الاسمنت البورتلاندي Ciment portland

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	Substance
			٥ 5		روتينون Rotenone
			٠,٢ 0.2		املاح السيلينيوم Sélénium sels
			٠,٤ 0.4	٠,٠٥ 0.05	هكسافلوريد السيلينيوم hexafluorure de sélénium
			٦ 6		سيلিকা: غير كريستالي Silice (SiO2) amorphe
			٠,٠٥ 0.05 ٠,١ 0.1	Cristobalite tridymite Quartz tripoli	سيلিকা: كريستالي Silice cristalline
			٠,٠١ 0.01		الفضة: غبار معدني واملاح ذائبة Argent: Poussières et sels solubles
ج p	٠,١٥ 0.15		٠,٠٥ 0.05		فلورو استات الصوديوم Fluoro acétate de sodium
			٠,١٥ 0.15		هيدروكسيد الصوديوم Hydroxyde de sodium
			٠,٥ 0.5	٠,١ 0.1	ستيلين Stibène (Sb H3)
			٠,١٥ 0.15		ستركنين Strychnine
	٤٢٥ 425	١٠٠ 100	٢١٥ 215	٥٠ 50	ستيرول Styrène
	١٠ 10	٥ 5	٥ 5	٢ 2	ثاني اوكسيد الكبريت dioxide de soufre
			١ 1		حامض الكبريتيك Acide sulfurique

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
	٧٥٠٠ 7500	١٢٥٠ 1250	٦٠٠٠ 6000	١٠٠٠ 1000	سداسي فلوريد الكبريت Hexafluorure de soufre
			٠,١ 0.1	٠,٠١ 0.01	خماسي فلوريد الكبريت Penta fluorure de soufre
			١٠ 10		T- ٥,٤,٢ 2,4,5- T
			٢ تنفس 2		تالك (لا يحتوي على اميانت) TALC
ج P			٠,٠٥ 0.05		TEPP TEPP
ج م P Ca			٧ 7	١ 1	٢,٢,١,١ - رابع كلوروايثان 1,1,2,2- Tetra chloroéthane
ج P			٠,٠٧٥ 0.075		رابع ايثيل الرصاص tetraethyl de plomb
ج P			١,٥ 1.5		تتريل Tetryl
ج P			٠,١ 0.1		املاح الثاليوم القابلة للذوبان Thalium: sels solubles
			٥ 5		ثيرام Thyram
			٢ 2		التصدير ومركباته غير العضوية عدا (Sn O2) Etain et dérivés minéraux sauf (Sn O2)
ج P			٠,١ 0.1		مركبات التصدير العضوية Dérivés organo-stanniques
م Ca			١٠ 10		ثاني اوكسيد التيتانيوم dioxyde de Titane
ج P	٥٦٠ 560	١٥٠ 150	٣٧٥ 375	١٠٠ 100	تولوين Toluène

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ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
م Ca	٠,١٥ 0.15	٠,٠٢ 0.02	٠,٠٤ 0.04	٠,٠٠٥ 0.005	ثنائي اليزوسيانات التولوين Toluène diisocyanate
م ج p Ca			٢٢ 22	٥ 5	اورثوتولويدين O-Toluidine
م Ca			١٧٠ 170	٢٥ 25	تتراكلورواثيلين Tetrachloro ethylène
م Ca	١٠٨٠ 1080	٢٠٠ 200	٢٧٠ 270	٥٠ 50	ثلاثي كلوراثيلين Trichloro ethylène
ج p			٥ 5		ثلاثي كلور نفتالين Trichloro naphtalène
ج p			٠,٥ 0.5		٦,٤,٦ - ثلاثي نيتروتولين 2,4,6 - Trinitrotoluène
ج p			٠,١ 0.1		ثلاثي اورثو كريسيل فوسفات Tri-orthocresyl phosphate
			٢٦٠ 260	١٠٠ 100	ترينتين Terpentine
م Ca	٠,٦ 0.6		٠,٢ 0.2		اورانيوم: املاح غير قابلة للذوبان Uranium; Sels insolubles
			٠,٠٥ 0.05		اورانيوم: املاح قابلة للذوبان Uranium: Sels Solubles
			٠,٠٥ 0.05		فاناديوم: أغبرة او ادخنة الفاناديوم: كخماسي اوكسيد الفاناديوم Vanadium: V2O5 Fumées ou poussières
م Ca	A-1	٥ حد أقصى c-5		١ 1	كلوريد الفينيل Chlorure de vinyle
			٠,١ 0.1		وارفارين Warfarine

*م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد: Pc: Peau

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	مغ/متر مكعب mg/m3	جزء بالمليون PPM	
	٦٠٠ 600	١٥٠ 150	٤٣٥ 435	١٠٠ 100	كرزيلين Xylènes (Tous les isomères)
	٢ 2		١ 1		ادخنة كلوريد الزنك Chlorure de Zinc (fumées)
	١٠ 10		٥ 5		ادخنة اكسيد الزنك Oxyde de Zinc, (fumées)
	١٠ 10		٥ 5		زركونيوم ومركباته Zirconium et dérivés

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد Pc: Peau

«ملحق خاص بمادة الاسبستوس»
مسرطن A-1

ملاحظات * Notes	حدود التعرض لمدة قصيرة Valeur Moyenne pour une courte durée d'exposition		المتوسط الزمني Valeur Moyenne		المادة نوع الليفة ١ Substance
	مغ/متر مكعب mg/m3	جزء بالمليون PPM	ليفة رسم ٣ fibre/cm3	جزء بالمليون PPM	
		٠,٥ 0.5			اموزيت Amosite
		٢ 2			كريزوتيل Chrysotile
		٢ 2			الانواع الاخرى Autres Variétés

* م: مسرطن، Ca: Cancérogène، ج: تتسرب من خلال الجلد Pc: Peau

- ١- تحديد الاليف: تعتبر ليفة: اذا كان طولها يتعدى الخمس ميكرومتر ومعدل طولها لعرضها يتعدى ٣:١.
- ٢- تخفيض المتوسط الزمني الى ليفة واحدة /سم (٣mc/١) بعد سنة من اصدار هذه المواصفات.

- B -

- ب -

Substances Cancérigènes A-1

مواد ذات تأثير سرطاني

وليس لها حدود عتبية معروفة ولا يسمح للعاملين بلامستها او التعرض لها بأي طريقة:

4- Aminobiphenyle

٤- امينوثنائي الفنيل

Benzidine

بنزيدين

Ether Chloromethylique

كلوروميثيل ايتير

B- Naphthylamine

بيتانفتيل امين

4- Nitrobiphényle

٤- نيتروثنائي الفنيل

2- Aminoflorine

٢- امينو فلورين

- C -

- ج -

Substances probablement Cancérigènes

مواد او عمليات صناعية يشتبه في انها مسرطن

Amithrole

اميترول

Production de trioxyde d'Antimoine

انتاج ثالث اكسيد الانتيمون

Production de trioxyde d'Arsenic

انتاج ثالث اكسيد الزرنيخ

Benzo (a) pyrène

بنزو (١) بيرين

Production d'oxyde de cadmium

انتاج اكسيد الكاديوم

3,3 - Dichlorobenzidine

٣,٣- ثنائي كلوروبنزيدين

Chlorure de dimethyl carbamyle

ثنائي ميشيل كرباميل كلورايد

Dibromoéthylène

ثنائي بروميد الاثيلين

hexamethyl phosphoamide

هكساميثيل فوسفور اميد

N- Nitroso dimethylamine

ن - نيتروزو ثنائي ميشيل امين

N- Phenyl B- Naphthylamine

ن - فينيل بيتانا فنتيل امين

ملحق رقم ١٠
الحدود المسموحة لشدة الصوت
ومدة التعرض الآمن له

١- الحد المسموح به لمنسوب شدة الضوضاء داخل اماكن الانشطة الانتاجية:

الحد الأقصى المسموح به لشدة الضوضاء المكافئة ديسبل (أ)	تحديد نوع المكان والنشاط
٩٠	١- اماكن العمل (فترة العمل اقل من ٨ ساعات) ويهدف الحد من مخاطر الضوضاء على حاسة السمع
٨٠	٢- اماكن العمل التي تستدعي سماع اشارات صوتية وحسن سماع الكلام
٦٥	٣- حجرات العمل لمناجحة وقياس وضبط التشغيل وبمتطلبات عالية
٧٠	٤- حجرات العمل لوحدات الحاسب الآلي او الآلات الكاتبة او ما شابه ذلك.
٦٠	٥- حجرات العمل للانشطة التي تتطلب تركيز ذهني روتيني

أقصى مدة تعرض للضوضاء مسموح بها بأماكن العمل (مصانع وورش) * القيمة المعطاة فيما بعد مبينة على اساس عدم التأثير على حاسة السمع.

- يجب الا تزيد شدة الضوضاء المكافئة عن ٩٠ ديسبل (أ) خلال فترة العمل اليومي ٨ ساعات.
- في حالة ارتفاع منسوب شدة الضوضاء المكافئة عن ٩٠ ديسبل (أ) يجب تقليل مدة التعرض طبقاً للجدول الآتي:

منسوب شدة الضوضاء (ديسبل)	٩٥	١٠٠	١٠٥	١١٠	١١٥
(١) مدة التعرض (ساعة)	٤	٢	١	١/٢	١/٤

- يجب الا يتجاوز منسوب شدة الضوضاء اللحظي خلال فترة العمل ١٣٤ ديسبل.
- في حالة التعرض لمستويات مختلفة من شدة الضوضاء أكثر من ٩٠ ديسبل.
(١) لفترات متقطعة خلال دورة العمل اليومي، يجب الا يزيد الناتج.

(أ) ١/ب + ٢/ب + عن الواحد الصحيح

حيث :

أ: مدة التعرض لمستوى معين من الضوضاء (ساعة).

ب: مدة التعرض المسموح بها عند نفس مستوى الضوضاء (ساعة).

(في حالة التعرض للضوضاء المنقطعة الصادرة من المطارق الثقيلة).

تتوقف على مدة التعرض (عدد الطرقات خلال فترة العمل اليومية) حسب شدة الضوضاء طبقا للجدول التالي:

شدة الصوت (ديسبل)	عدة الطرقات المسموح بها خلال فترة العمل اليومي
١٣٥	٣٠٠
١٣٠	١٠٠٠
١٢٥	٣٠٠٠
١٢٠	١٠٠٠٠
١١٥	٣٠٠٠٠

تعتبر الضوضاء الصادرة من المطارق الثقيلة منقطعة اذا كانت الفترة بين كل طرقة والتي تليها ١ ثانية أو أكثر. أما اذا كانت الفترة اقل من ذلك فتعتبر ضوضاء مستمرة ويطبق عليها ما جاء في البنود الأربعة السابقة.

٢- الحد الأقصى المسموح به لشدة الضوضاء في المناطق المختلفة

الحد المسموح به لشدة الصوت ديسبل (أ)			نوع المنطقة
ليلا من الى	مساء من الى	نهارا من الى	
٥٤ - ٥٥	٥٠ - ٦٠	٥٥ - ٦٥	المنطقة التجارية والإدارية ووسط المدينة
٤٠ - ٥٠	٤٥ - ٥٥	٥٠ - ٦٠	المناطق السكنية وبها بعض الورش أو الأعمال التجارية أو على طريق عام
٣٥ - ٤٥	٤٠ - ٥٠	٤٥ - ٥٥	المناطق السكنية في المدينة
٣٠ - ٤٠	٣٥ - ٤٥	٤٠ - ٥٠	الضواحي السكنية مع وجود حركة ضعيفة
٢٥ - ٣٥	٣٠ - ٤٠	٣٥ - ٤٥	المناطق السكنية الريفية ومستشفيات وحدائق
٥٠ - ٦٠	٥٥ - ٦٥	٦٠ - ٧٠	المناطق الصناعية (صناعات ثقيلة)

نهارا من ٧ صباحا حتى ٦ مساء
مساء من ٦ مساء حتى ١٠ مساء
ليلا من ١٠ مساء حتى ٧ صباحا

ملحق رقم ١١

Valeurs limites à respecter lors de l'incinération des huiles usagées
(incinérateurs de capacité thermique > 3 MW)

الحدود القصوى المسموح بها لملوثات الهواء في الانبعاثات الناجمة عن حرق الزيوت المستعملة
(حراقات ذات قوة حرارية لا تقل عن ٣ ميغاوات)

Valeur maximale mg/m ³	الحدود القصوى ملغ/متر مكعب	Elément	الملوث
0.5	٠,٥	Cd	كادميوم
1	١	Ni	نيكل
1.5	١,٥	Cr+ Cu+V	كروم + نحاس + فناديوم
5	٥	Pb	رصاص
100	١٠٠	Cl en HCl	كلور (كحامض الهيدروكلوريك)
5	٥	F en HF	فلور (كحامض الهيدروفلوريك)
-	-	Poussière	الجسيمات العالقة الكلية
-	-	SO ₂	ثاني أكسيد الكبريت

ملحق رقم ١٢

Valeurs limites à respecter lors de l'incinération des ordures ménagères

الحدود القصوى المسموح بها لملوثات الهواء في الانبعاثات
الناجمة عن حرق النفايات المنزلية

Capacité de l'incinérateur

طاقة الاستيعاب

> 3 tonnes /H أكثر من ٣ اطنان/ساعة		1-3 tonnes /H من ١ - ٣ طن في الساعة		<1 tonne/H أقل من طن في الساعة		Element	الملوث
Valeur maximale mg/m ³	الحدود القصوى ملغ/متر مكعب	Valeur maximale mg/m ³	الحدود القصوى ملغ/متر مكعب	Valeur maximale mg/m ³	الحدود القصوى ملغ/متر مكعب		
30	٣٠	100	١٠٠	200	٢٠٠	totales	الجسيمات العالقة الكلية
5	٥	5	٥	-	-	Pb+ Cr+ Cu+ Mn	رصاص + كروم + نحاس + مانتانيز
1	١	1	١	-	-	Ni + As	نيكل + زرنيخ
0.2	٠,٢	0.2	٠,٢	-	-	Cd+Hg	كادميوم وزئبق

> 3 tonnes /H أكثر من ٣ اطنان/ ساعة		1-3 tonnes /H من ١ - ٣ طن في الساعة		<1 tonne/H أقل من طن في الساعة		Element	الملوث
Valeur maximale mg/m3	الحدود القصوى ملغ/متر مكعب	Valeur maximale mg/m3	الحدود القصوى ملغ/متر مكعب	Valeur maximale mg/m3	الحدود القصوى ملغ/متر مكعب		
50	٥٠	100	١٠٠	250	٢٥٠	Cl en HCl	كلور (كحامض هيدروكلوريك)
2	٢	4	٤	-	-	F en HF	الفلور (كحامض هيدروفلوريك)
300	٣٠٠	300	٣٠٠	-	-	SO 2	ثاني أكسيد الكبريت

ملحق رقم ١٣

Valeurs limites à respecter dans les émanations provenant des cimenteries

الحدود القصوى المسموح بها لملوثات الهواء من الانبعاثات في معامل الترابية

SO2

ثاني أكسيد الكبريت

Teneurs Limites (mg/Nm3)	الحدود القصوى (ملغ/متر مكعب)
--------------------------	------------------------------

Fours

500 _ ٥٠٠

الأفران

ملاحظة: يرفع الحد الأقصى الى ١٨٠٠ ملغ/متر مكعب في الحالات الاستثنائية التالية:

١- احتواء المواد الأولية على مشتقات للكبريت تؤدي الى انبعاث ثاني أكسيد الكبريت، مما يصعب تلافيه.

٢- عدم امكانية المواد الأولية من امتصاص مشتقات الكبريت الموجودة في الوقود المستعمل على ان يتقدم المعمل بالوثائق العلمية المبررة.

Poussières

الجسيمات العالقة الكلية

	Teneurs (ملغ / متر مكعب)	Limites (mg/Nm3) الحدود القصوى
Fours existants 1	الافران الحالية	150
Fours en Voie de construction	الافران قيد الانشاء	50

		Teneurs (ملغ / متر مكعب)	Limites (mg/Nm3) الحدود القصوى
Refroidisseurs du clinker ² (en l'absence de recyding de gaz)	مبردات الكلنكر (في حال عدم اعادة استعمال الغاز)	100	١٠٠
Broyeurs (à cru, clinker et à laitier) ³	مطاحن (المواد الاولية، والكلنكر...)	50	٥٠
autres installations ⁴	غيرها من المنشآت	50	٥٠

ملاحظات:

١: تعطى مهلة ثلاث سنوات للمنشآت الحالية حيث المعدلات الشهرية تتجاوز الـ ٥٠ ملغ/متر مكعب، وثمانى سنوات للمنشآت حيث المعدلات الشهرية هي دون الـ ١٥٠ ملغ/متر مكعب، تخفض بعدها الحدود القصوى الى ٥٠ ملغ/متر مكعب.

٢: تعطى مهلة ثلاثة سنوات للمنشآت الحالية حيث المعدلات الشهرية تتجاوز الـ ٢٥٠ ملغ/متر مكعب، وثمانى سنوات للمنشآت حيث المعدلات الشهرية هي دون الـ ٢٥٠ ملغ/متر مكعب . تخفض بعدها الحدود القصوى الى ١٠٠ ملغ/متر مكعب.

٣: تعطى مهلة ثلاث سنوات للمنشآت الحالية حيث المعدلات الشهرية تتجاوز الـ ١٥٠ ملغ/متر مكعب وثمانى سنوات للمنشآت حيث المعدلات الشهرية هي دون الـ ١٥٠ ملغ/متر مكعب، تخفض بعدها الحدود القصوى الى ٥٠ ملغ/متر مكعب.

٤: تعطى مهلة ثلاث سنوات للمنشآت الحالية حيث المعدلات الشهرية تتجاوز الـ ١٥٠ ملغ/متر مكعب وست سنوات للمنشآت حيث المعدلات الشهرية هي دون الـ ١٥٠ ملغ/متر مكعب تخفض بعدها الحدود القصوى الى ٥٠ ملغ/متر مكعب.

Oxydes
d'azote Nox

او كسيدات
النيتروجين

	Teneurs Limites (mg/Nm3) الحدود القصوى (ملغ/متر مكعب)
Fours vole Séche avec récupération de la chaleur	< 1200
الأفران العاملة على الطريقة الجافة ومع الاستعمال الاضافى للحرارة.	< ١٢٠٠
Fours en Voie Seche ou semi-humide	< 1500
الأفران التى تعمل على الطريقة الجافة او النصف رطبة.	< ١٥٠٠
Fours voie humide sans récupération de la chaleur	< 1800
الأفران التى تعمل على الطريقة الرطبة (دون الاستعمال الاضافى للحرارة)	< ١٨٠٠

Métaux Lourds

المعادن الثقيلة

Teneurs Limites (mg/Nm ³) الحدود القصوى (ملغ/متر مكعب)		
Cd+Ti+ Hg	0.2 ٠,٢	(particulaire + gazeux) كجزيات وغازات
As+ Co+Ni+ Sc+ Te	1 ١	Particulaire جزيات
Sb+Cr+Cu+Sn+Mn+ Pb+Va+Zn	5 ٥	Particulaire جزيات

ملحق رقم ١٤

الحدود القصوى لمكونات الهواء الخارجي

Teneurs Maximales Autorisées pour les Polluants Atmosphériques

Durée d'exposition	مدة التعرض	Teneur maximale en µg/m ³	الحد الأقصى ميكروغرام/متر مكعب	Polluant	الملوث
1 heure	ساعة	350	٣٥٠	Dioxyde de soufre (SO ₂)	ثنائي اكسيد الكبريت
24 heures	٢٤ ساعة	120	١٢٠		
1 année	سنة	٤0	٤٠		
1 heure	ساعة	200	٢٠٠	Dioxyde d'azote (NO ₂)	ثنائي / اكسيد النتروجين
24 heures	٢٤ ساعة	150	١٥٠		
1 année	سنة	100	١٠٠		
1 heure	ساعة	150	١٥٠	Ozone (O ₃)	الاوزون
8 heures	٨ ساعات	100	١٠٠		
1 heure	ساعة	30000	٣٠٠٠٠	Monoxyde de carbone (CO)	أول اكسيد الكربون
8 heures	٨ ساعات	10000	١٠٠٠٠		
24 heures	٢٤ ساعة	120	١٢٠	Particules en suspension (totales)	الجسيمات العالقة الكلية
24 heures	٢٤ ساعة	٤0	٤٠	Particules noires en suspension inférieures à 10 microns PM ₁₀	الجسيمات العالقة معقاة كدخان اسود يقل حجمها عن ١٠ ميكرون
1 an	سنة	1.0	١,٠٠٠	Plomb	الرصاص
1 an	سنة	5 ppb	٥	Benzène	بنزين

**ANNEX 3 Guidelines for the
Protection and Remediation
of Rivers and River Landscapes
in the Republic of Lebanon**

Guideline for the Protection and Remediation of Rivers and River Landscapes in the Republic of Lebanon

Human activities are degrading the environment and quality of life in the rivers and river valleys all over Lebanon. Partially the rivers and the surrounding areas are today disturbed forever by human activities.

- The Lebanese rivers are highly polluted by:
 - industrial discharges,
 - direct or indirect discharges of sewage from human settlements and
 - leachate from waste disposal,
 - diffuse flows from agricultural used areas contaminated with fertilizers and pesticides.
- The surrounding landscapes of the rivers and especially the river valleys and the river mouths are partially disturbed or polluted by:
 - industry
 - uncontrolled settlements,
 - landfills,
 - stone quarries and
 - sand spilling

In order to combat pollution of rivers and threatening of river landscapes in Lebanon, principles must be defined within a framework of guidelines

This Guidelines deals with the protection and remediation of Lebanese rivers and the river landscape:

- The Lebanese rivers have to be kept free from pollution,
- The current state of the rivers has to be improved and future pollution shall be avoided.
- Characteristic river landscapes has to be prevented from uncontrolled urbanization and from industrial settlements,
- Unique river landscapes has to be restored and managed as protected areas,
- The urgency of these tasks has to be subject to all further actions.

Part I General Guidelines

Article 1

- (1) This Guideline concerns the protection of rivers and their landscapes
The objective of this guideline is to protect the rivers and their surrounding areas from pollution, disturbance of the river valleys and to save them for future generations as natural as possible.
- (2) Protection in the sense of this guideline means:
 - (i) the Lebanese rivers have to be kept free from pollution,
 - (ii) the further pollution of the rivers has to be prevented and their current state has to be improved,
 - (iii) characteristic river landscapes has to be prevented from uncontrolled urbanization and from industrial settlements,
 - (iv) unique river landscapes has to be restored and managed as protected areas,

Article 2

- (1) All involved parties shall cooperate in the protection of the rivers and their landscapes to prevent their pollution and the pollution of their drainage areas.
- (2) They shall in so doing in particular endeavor:
 - (i) to enable use to be made of the river, in particular the obtaining of supplies of drinking water from the rivers or from bank-filtered waters, the agricultural use of the waters and sediments and the use for recreation;
 - (ii) to achieve as natural as possible an ecosystem with a healthy diversity of species;
 - (iii) to avoid as much as possible the construction of buildings along the river banks outside the existing settlements in order to protect the natural landscape for nature conservation and recreation;
 - (iv) to reduce substantially the pollution of the Sea from the drainage areas of the rivers.

Article 7

Zoning plans and nature conservation plans for the surrounding areas of the main rivers including staged action plans for measures to be taken for the implementation of these plans have to be developed.

Article 8

- (1) In accordance with legislation framework principles, a water committee for the monitoring of environmental matters should be formed. It shall be chaired by a leading representative of the MoE.
- (2) This water committee shall assist the Lebanese Government in all water and river related questions. Its responsibility shall include the approval and review of the activities as described in the Articles of this guideline and of all other guidelines prepared in the fulfilling of this guideline as well as in the drafting of water related legislation.
- (3) One or more of the representatives shall submit to the committee a draft of the measures to be taken. The committee shall deliver its opinion on the draft within a time limit that the chairman may lay down according to the urgency of the matter. The opinion shall be delivered by a simple majority. The votes of the representatives within the committee shall be weighted in the manner which has to be set out in the first meeting of the committee.
- (4) The Government shall adopt the measures envisaged if they are in accordance with the opinion of the relevant ministry.

Article 9

The involved parties shall inform the governmental water committee of all the basic matters required for the water committee to fulfil its tasks and of the measures taken and the total resources used therefor. The water committee may submit proposals to the involved parties regarding improvements

Article 10

- (1) Any Activity or settlement should be subject to an EIA/EIS report.
- (2) Coastal area management programs and river management programs shall be merged.

Article 11

The responsible governmental parties shall prepare the basic matters required for the implementation of penalties for the pollution or disturbance for rivers and their surrounding areas

Part II Activities

Article 1

In order to fulfill the Guidelines given in part I the following activities have to be taken for the protection and remediation of rivers and their surrounding landscapes.

Article 2

- (1) For the evaluation of the existing situation a joint program of measurements and investigations to demonstrate the quantity as well as quality of the waters, sediments and effluents has to be developed.
- (2) Surveys showing major point sources of discharges of harmful materials (discharge charts and wastewater register) from industry, settlements and other sources like landfills have to be prepared and water pollution from diffuse sources has to be estimated and extrapolated.

Article 3

- (1) A staged program for urban waste water collection and treatment according to the risks and effects to the receiving waters and the quantity and pollution of the discharge has to be developed.
- (2) Specific quality objectives taking account of the requirements with regard to the use of the waters, the particular conditions of the river course and the natural aquatic communities have to be developed.
- (3) Standardized methods for the classification of river water qualities has to be compiled.

Article 4

- (1) Programs for the design and construction of waste water treatment plants for the reduction of discharges of harmful materials from the point sources of both settlements and industry as well as programs for the reductions of pollution from diffuse sources have to be implemented including timetables and cost assessments.

Article 5

Protective measures such as emergency basins and oil separators to prevent water pollution resulting from accidents in industry and on the roads in the river valleys have to be developed.

Article 6

- (1) The main elements that constitute a river landscape have to be analyzed and classified and an inventory of land-use on the main river basins has to be prepared.
- (2) The hydrological situation in the river areas has to be described and the main influencing factors has to be recorded.
- (3) Documents regarding the ecological importance of the various biotope elements of the waters and proposals regarding the improvement of conditions for aquatic and coastal communities have to be prepared.
- (4) Planned and existing types of utilization of the waters, which may have serious regional repercussions including hydraulic structures and regulation of the waters, have to be investigated.

Article 7

Zoning plans and nature conservation plans for the surrounding areas of the main rivers including staged action plans for measures to be taken for the implementation of these plans have to be developed.

**ANNEX 4 Guidelines for the
Treatment of Urban
Waste Water from the
Republic of Lebanon**

Guideline concerning Urban waste water treatment in the Republic of Lebanon

In order to combat pollution of waters in Lebanon the

Guideline for the Protection and remediation of Rivers and River Landscapes in the Republic of Lebanon

was prepared.

In order to fulfill this Guideline which deals with the treatment of Urban Waste Water was prepared.

The following points are essential for the environment:

- To prevent the environment from being adversely affected by the disposal of insufficiently-treated urban waste water, there is a general need for secondary treatment of urban waste water;
- In sensitive areas it can be necessary to require more stringent treatment; whereas in some less sensitive areas a primary treatment could be considered appropriate;
- Industrial waste water entering collecting systems as well as the discharge of waste water and disposal of sludge from urban waste water treatment plants should be subject to general rules or regulations and/or specific authorizations;
- Discharges from certain industrial sectors of biodegradable industrial waste water not entering urban waste water treatment plants before discharge to receiving waters should be subject to appropriate requirements;
- The recycling of sludge arising from waste water treatment should be encouraged; whereas the disposal of sludge to surface waters should be phased out;
- Monitoring of treatment plants, receiving waters and the disposal of sludge is necessary to ensure that the environment is protected from the adverse effects of the discharge of waste waters,
- Information on the disposal of waste water and sludge have to be made available to the public in the form of periodic reports;

Article 1

This Guideline concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors.

The objective of the Guideline is to protect the environment from the adverse effects of the above mentioned waste water discharges.

Article 2

For the purpose of this Guideline:

1. 'urban waste water' means domestic waste water or the mixture of domestic waste water with industrial waste water and/or run-off rain water;
2. 'domestic waste water' means waste water from residential settlements and services which originates predominantly from the human metabolism and from household activities;
3. 'industrial waste water' means any waste water which is discharged from premises used for carrying on any trade or industry, other than domestic waste water and run-off rain water;
4. 'agglomeration' means an area where the population and/or economic activities are sufficiently concentrated for urban waste water to be collected and conducted to an urban waste water treatment plant or to a final discharge point;
5. 'collecting system' means a system of conduits which collects and conducts urban waste water;
6. 'One(1) p.e. (population equivalent)' means the organic biodegradable load having a five-day biochemical oxygen demand (BOD_5) of 60 g of oxygen per day;
7. 'primary treatment' means treatment of urban waste water by a physical and/or chemical process involving settlement of suspended solids, or other processes in which the BOD_5 of the incoming waste water is reduced by at least 20 % before discharge and the total suspended solids of the incoming waste water are reduced by at least 50 %;
8. 'secondary treatment' means treatment of urban waste water by a process generally involving biological treatment with a secondary settlement or other process in which the requirements established in Table I of Annex I are respected;
9. 'appropriate treatment' means treatment of urban waste water by any process and/or disposal system which after discharge allows the receiving waters to meet the relevant quality objectives and the relevant provisions of this and other Lebanese Guidelines;
10. 'Sludge' means residual sludge, whether treated or untreated, from urban waste water treatment plants;

11. 'eutrophication' means the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned;
12. 'estuary' means the transitional area at the mouth of a river between fresh-water and coastal waters.
13. 'coastal waters' means the waters outside the low-water line or the outer limit of an estuary.

Article 3

1. All agglomerations have to be provided with collecting systems for urban waste water,

at the latest by 31 December 2010 for those with a population equivalent (p.e.) of more than 15000, and

at the latest by 31 December 2015 for those with a p.e. of between 2000 and 15000.

For urban waste water discharging into receiving waters which are considered 'sensitive areas' as defined under Article 5, collection systems have to be provided at the latest by 31 December 2005 for agglomerations of more than 10000 p.e.

Where the establishment of a collecting system is not justified either because it would produce no environmental benefit or because it would involve excessive cost, individual systems or other appropriate systems which achieve the same level of environmental protection shall be used.

2. Collecting systems described in paragraph 1 shall satisfy the requirements of Appendix I (A). These requirements may be amended in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and Re-mediation of Rivers and River Landscapes .

Article 4

1. All urban waste water entering collecting systems shall before discharge be subject to secondary treatment or an equivalent treatment as follows:

- at the latest by 31 December 2010 for all discharges from agglomerations of more than 15000 p.e.,
- at the latest by 31 December 2015 for all discharges from agglomerations of between 10000 and 15000 p.e.,

- at the latest by 31 December 2015 for discharges to fresh-water and estuaries from agglomerations of between 2000 and 10000 p.e.
2. Urban waste water discharges to waters situated in high mountain regions (over 1500 m above sea level) where it is difficult to apply an effective biological treatment due to low temperatures may be subjected to treatment less stringent than that prescribed in paragraph 1, provided that detailed studies indicate that such discharges do not adversely affect the environment.
 3. Discharges from urban waste water treatment plants described in paragraphs 1 and 2 shall satisfy the relevant requirements of Appendix I.B. These requirements may be amended in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and Re-mediation of Rivers and River Landscapes .
 4. The load expressed in p.e. shall be calculated on the basis of the maximum average weekly load entering the treatment plant during the year, excluding unusual situations such as those due to heavy rain.

Article 5

1. For the purposes of paragraph 2 less sensitive areas according to the criteria laid down in Appendix II. shall be identified by 31 of December 1999.
2. Urban waste water entering collecting systems shall before discharge into sensitive areas be subject to more stringent treatment than that described in Article 4, by 31 December 2005 at the latest for all discharges from agglomerations of more than 10000 p.e.
3. Discharges from urban waste water treatment plants described in paragraph 2 shall satisfy the relevant requirements of Appendix I B. These requirements may be amended in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and Re-mediation of Rivers and River Landscapes .
4. Alternatively, requirements for individual plants set out in paragraphs 2 and 3 above need not apply in sensitive areas where it can be shown that the minimum percentage of reduction of the overall load entering all urban waste water treatment plants in that area is at least 75% for total phosphorus and at least 75 % for total nitrogen.
5. Discharges from urban waste water treatment plants which are situated in the relevant catchment areas of sensitive areas and which contribute to the pollution of these areas shall be subject to paragraphs 2, 3 and 4.
6. The identification of sensitive areas has to be reviewed at intervals of no more than four years
7. Areas identified as sensitive following review under paragraph 6 shall within seven years meet the above requirements.

Article 6

1. For the purposes of paragraph 2, less sensitive areas according to the criteria laid down in Appendix II. can be identified by 31 of December 1999.
2. Urban waste water discharges from agglomerations of between 10000 and 150000 p.e. to coastal waters and those from agglomerations of between 2000 and 10000 p.e. to estuaries situated in areas described in paragraph 1 may be subjected to treatment less stringent than that prescribed in Article 4 providing that:

such discharges receive at least primary treatment as defined in Article 2 (7) in conformity with the control procedures laid down in Appendix I D,

comprehensive studies indicate that such discharges will not adversely affect the environment.

3. It has be ensured that the identification of less sensitive areas is reviewed at intervals of not more than four years.
4. It has be ensured that areas no longer identified as less sensitive shall within seven years meet the requirements of Articles 4 and 5 as appropriate.

Article 7

It has to be ensured that, by 31 December 2015, urban waste water entering collecting systems shall before discharge be subject to appropriate treatment as defined in Article 2 (9) in the following cases:

for discharges to fresh-water and estuaries from agglomerations of less than 2000 p.e.,

for discharges to coastal waters from agglomerations of less than 10000 p.e.

Article 8

1. In exceptional cases due to technical problems and for geographically defined population groups, a special request for a longer period for complying with Article 4 may be submitted.
2. This request, for which grounds must be duly put forward, shall set out the technical difficulties experienced and must propose an action program with an appropriate timetable to be undertaken to implement the objective of this Guideline.
3. Only technical reasons can be accepted and the longer period referred to in paragraph 1 may not extend beyond 31 December 2015.
4. A governmental commission shall examine this request and take appropriate measures in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and Re-mediation of Rivers and River Landscapes .

5. In exceptional circumstances, when it can be demonstrated that more advanced treatment will not produce any environmental benefits, discharges into less sensitive areas of waste waters from agglomerations of more than 150000 p.e. may be subject to the treatment provided for in Article 6 for waste water from agglomerations of between 10000 and 150000 p.e.
6. In such circumstances, the relevant documentation shall be submitted to a governmental commission. The commission will examine the case and take appropriate measures in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and Re-mediation of Rivers and River Landscapes .

Article 9

It should be ensured that the urban waste water treatment plants built to comply with the requirements of Articles 4, 5, 6 and 7 are designed, constructed, operated and maintained to ensure sufficient performance under all normal local climatic conditions. When designing the plants, seasonal variations of the load shall be taken into account.

Article 10

1. It should be ensured that, before 31 December 1998, the discharge of industrial waste water into collecting systems and urban waste water treatment plants is subject to prior regulations and/or specific authorizations by the competent authority or appropriate body.
2. Regulations and/or specific authorization shall satisfy the requirements of Appendix I C. These requirements may be amended in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and remediation of Rivers and River Landscapes .
3. Regulations and specific authorization shall be reviewed and if necessary adapted at regular intervals.

Article 11

1. Treated waste water shall be reused whenever appropriate. Disposal routes shall minimize the adverse effects on the environment.
2. Competent authorities or appropriate bodies shall ensure that the disposal of waste water from urban waste water treatment plants is subject to prior regulations and/or specific authorization.
3. Prior regulations and/or specific authorization of discharges from urban waste water treatment plants made pursuant to paragraph 2 within agglomerations of 2000 to 10000 p.e. in the case of discharges to fresh waters and estuaries, and of 10000 p.e. or more in respect of all discharges, shall contain conditions to satisfy the relevant requirements of Appendix I B. These requirements may be amended in accordance with the procedure laid

down in Article 8 of the Guideline for the Protection and remediation of Rivers and River Landscapes .

4. Regulations and/or authorization shall be reviewed and if necessary adapted at regular intervals.

Article 12

1. It should be ensured that by 31 December 2010 biodegradable industrial waste water from plants belonging to the industrial sectors listed in Appendix III which does not enter urban waste water treatment plants before discharge to receiving waters shall before discharge respect conditions established in prior regulations and/or specific authorization by the competent authority or appropriate body, in respect of all discharges from plants representing 4000 p.e. or more.
2. By 31 of December 1998 requirements appropriate to the nature of the industry concerned for the discharge of such waste water shall be set.

Article 13

Sludge arising from waste water treatment shall be re-used whenever appropriate. Disposal routes shall minimize the adverse effects on the environment.

Competent authorities or appropriate bodies shall ensure that before 31 December 2000 the disposal of sludge from urban waste water treatment plants is subject to general rules or registration or authorization.

It shall be ensured that by 31 December 2005 the disposal of sludge to surface waters by dumping from ships, by discharge from pipelines or by other means is phased out.

Until the elimination of the forms of disposal mentioned in paragraph 3, it shall be ensured that the total amount of toxic, persistent or bioaccumulable materials in sludge disposed of to surface waters is licensed for disposal and progressively reduced.

Article 14

1. Competent authorities or appropriate bodies shall monitor:
 - discharges from urban waste water treatment plants to verify compliance with the requirements of Appendix I.B in accordance with the control procedures laid down in Appendix I.D,
 - amounts and composition of sludges disposed of to surface waters.
2. Competent authorities or appropriate bodies shall monitor waters subject to discharges from urban waste water treatment plants and direct discharges as described in Article 12 in cases where it can be expected that the receiving environment will be significantly affected.

3. In the case of a discharge subject to the provisions of Article 6 and in the case of disposal of sludge to surface waters, Competent authorities or appropriate bodies shall monitor and carry out any other relevant studies to verify that the discharge or disposal does not adversely affect the environment.
4. Guidelines on the monitoring referred to in paragraphs 1, 2 and 3 may be formulated in accordance with the procedure laid down in Article 8 of the Guideline for the Protection and remediation of Rivers and River Landscapes .

Article 15

Every two years the relevant authorities or bodies shall publish situation reports on the disposal of urban waste water and sludge in their areas. These reports shall be transmitted to the governmental commission.

REQUIREMENTS FOR URBAN WASTE WATER

D) Collecting systems (1)

Collecting systems shall take into account waste water treatment requirements.

The design, construction and maintenance of collecting systems shall be undertaken in accordance with the best technical knowledge not entailing excessive costs, notably regarding:

- volume and characteristics of urban waste water,
- prevention of leaks,
- limitation of pollution of receiving waters due to storm water overflows.

I) Discharge from urban waste water treatment plants to receiving waters ¹

1. Waste water treatment plants shall be designed or modified so that representative samples of the incoming waste water and of treated effluent can be obtained before discharge to receiving waters.
2. Discharges from urban waste water treatment plants subject to treatment in accordance with Articles 4 and 5 shall meet the requirements shown in Table 1.
3. Discharges from urban waste water treatment plants to those sensitive areas which are subject to eutrophication as identified in Appendix II.A (a) shall in addition meet the requirements shown in Table 2 of this Appendix
4. More stringent requirements than those shown in Table 1 and/or Table 2 shall be applied where required to ensure that the receiving waters satisfy any other relevant Guidelines.
5. The points of discharge of urban waste water shall be chosen, as far as possible, so as to minimize the effects on receiving waters.

¹ Given that it is not possible in practice to construct collecting systems and treatment plants in a way such that all waste water can be treated during situations such as unusually heavy rainfall, measures shall to be taken to limit pollution from storm water overflows. Such measures could be based on dilution rates or capacity in relation to dry weather flow, or could specify a certain acceptable number of overflows per year.

I) Industrial waste water

Industrial waste water entering collecting systems and urban waste water treatment plants shall be subject to such pre-treatment as is required in order to:

- protect the health of staff working in collecting systems and treatment plants,
- ensure that collecting systems, waste water treatment plants and associated equipment are not damaged,
- ensure that the operation of the waste water treatment plant and the treatment of sludge are not impeded,
- ensure that discharges from the treatment plants do not adversely affect the environment, or prevent receiving water from complying with other Guidelines,
- ensure that sludge can be disposed of safely in an environmentally acceptable manner.

I) Reference methods for monitoring and evaluation of results

1. A monitoring method has to be applied which corresponds at least with the level of requirements described below.

Alternative methods to those mentioned in paragraphs 2, 3 and 4 may be used provided that it can be demonstrated that equivalent results are obtained.

2. Flow-proportional or time-based 24-hour samples shall be collected at the same well-defined point in the outlet and if necessary in the inlet of the treatment plant in order to monitor compliance with the requirements for discharged waste water laid down in this Guideline.

Good international laboratory practices aiming at minimizing the degradation of samples between collection and analysis shall be applied.

3. The minimum annual number of samples shall be determined according to the size of the treatment plant and be collected at regular intervals during the year:

- 2000 to 9999 p. e.: 12 samples during the first year.

Four samples in subsequent years, if it can be shown that the water during the first year complies with the provisions of the Guideline; if one sample of the four fails, 12 samples must be taken in the year that follows.

- 10000 to 49999 p. e.: 12 samples.
- 50000 p. e. or over: 24 samples.

1. The treated waste water shall be assumed to conform to the relevant parameters if, for each relevant parameter considered individually, samples of the water show that it complies with the relevant parametric value in the following way:
 - i) for the parameters specified in Table 1 and Article 2 (7), a maximum number of samples which are allowed to fail the requirements, expressed in concentrations and/or percentage reductions in Table 1 and Article 2 (7), is specified in Table 3;
 - ii) for the parameters of Table 1 expressed in concentrations, the failing samples taken under normal operating conditions must not deviate from the parametric values by more than 100 %. For the parametric values in concentration relating to total suspended solids deviations of up to 150 % may be accepted;
 - iii) for those parameters specified in Table 2 the annual mean of the samples for each parameter shall conform to the relevant parametric values.
1. Extreme values for the water quality in question shall not be taken into consideration when they are the result of unusual situations such as those due to heavy rain.

Table 1: Requirements for discharges from urban waste water treatment plants subject to Articles 4 and 5 of the Guideline. The values for concentration or for the percentage of reduction shall apply.

<i>Parameters</i>	<i>Concentration</i>	<i>Minimum percentage of reduction (1)</i>	<i>Reference method of measurement</i>
Biochemical oxygen demand (BOD ₅ at 20 °C) without nitrification (2)	25 mg/l O ₂	70-90 40 under Article 4 (2)	Homogenized, unfiltered, undecanted sample. Determination of dissolved oxygen before and after five-day incubation at 20 °C ± 1 °C, in complete darkness. Addition of a nitrification inhibitor
Chemical oxygen demand (COD)	125 mg/l O ₂	75	Homogenized, unfiltered, undecanted sample Potassium dichromate
Total suspended solids	35 mg/l (3) 35 under Article 4 (2) (more than 10000 p.e.) 60 under Article 4 (2) (2000-10000 p.e.)	90 (3) 90 under Article 4 (2) (more than 10000 p.e.) 70 under Article 4 (2) (2000-10000 p.e.)	- Filtering of a representative sample through a 0,45 micrometer filter membrane. Drying at 105 °C and weighing - Centrifuging of a representative sample (for at least five minutes with mean acceleration of 2800 to 3200 g), drying at 105 °C and weighing

- (1) Reduction in relation to the load of the influent.
- (2) The parameter can be replaced by another parameter: total organic carbon (TOC) or total oxygen demand (TOD) if a relationship can be established between BOD₅ and the substitute parameter.
- (3) This requirement is optional.

Analyses concerning discharges from lagooning shall be carried out on filtered samples; however, the concentration of total suspended solids in unfiltered water samples shall not exceed 150 mg/l.

Table 2: Requirements for discharges from urban waste water treatment plants to sensitive areas which are subject to eutrophication as identified in Appendix II.A (a). One or both parameters may be applied depending on the local situation. The values for concentration or for the percentage of reduction shall apply.

<i>Parameters</i>	<i>Concentration</i>	<i>Minimum percentage of reduction (1)</i>	<i>Reference method of measurement</i>
Total phosphorus	2 mg/l P (10000 - 100000 p. e.) 1 mg/l P (more than 100000 p. e.)	80	Molecular absorption spectrophotometry
Total nitrogen (2)	15 mg/l N (10000 - 100000 p. e.) 10 mg/l N (more than 100000 p. e.) (3)	70-80	Molecular absorption spectrophotometry

- (1) Reduction in relation to the load of the influent.
- (2) Total nitrogen means: the sum of total Kjeldahl-nitrogen (organic N + NH₃), nitrate (NO₃)-nitrogen and nitrite (NO₂)-nitrogen.
- (3) Alternatively, the daily average must not exceed 20 mg/l N. This requirement refers to a water temperature of 12° C or more during the operation of the biological reactor of the waste water treatment plant. As a substitute for the condition concerning the temperature, it is possible to apply a limited time of operation, which takes into account the regional climatic conditions. This alternative applies if it can be shown that paragraph 1 of Appendix I.D is fulfilled.

Table 3

<i>Series of samples taken in any year</i>	<i>Maximum permitted number of samples which fail to conform;</i>
4-7	1
8-16	2
17-28	3
29-40	4
41-53	5
53-67	6
68-81	7
82-95	8
96-110	9
111-125	10
126-140	11
141-155	12
156-171	13
172-187	14
188-203	15
204-219	16
220-235	17
236-251	18
252-268	19
269-284	20
285-300	21
301-317	22
318-334	23
335-350	24
351-365	25

CRITERIA FOR IDENTIFICATION OF SENSITIVE AND LESS SENSITIVE AREAS

I. Sensitive areas

A water body must be identified as a sensitive area if it falls into one of the following groups:

- (i) Natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken.

The following elements might be taken into account when considering which nutrient should be reduced by further treatment:

- a) lakes and streams reaching lakes/reservoirs/closed bays which are found to have a poor water exchange, whereby accumulation may take place. In these areas, the removal of phosphorus should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication. Where discharges from large agglomerations are made, the removal of nitrogen may also be considered;
 - b) estuaries, bays and other coastal waters which are found to have a poor water exchange, or which receive large quantities of nutrients. Discharges from small agglomerations are usually of minor importance in those areas, but for large agglomerations, the removal of phosphorus and/or nitrogen should be included unless it can be demonstrated that the removal will have no effect on the level of eutrophication;
- (ii) Surface freshwaters intended for the abstraction of drinking water which could contain more than the concentration of nitrate laid down under the relevant provisions of a Lebanese guideline concerning the quality required of surface water intended for the abstraction of drinking water if action is not taken;
 - (iii) Areas where further treatment than that prescribed in Article 4 of this Guideline is necessary to fulfil other Guidelines.

II. Less Sensitive areas

A marine water body or area can be identified as a less sensitive area if the discharge of waste water does not adversely affect the environment as a result of morphology, hydrology or specific hydraulic conditions which exist in that area.

When identifying less sensitive areas, the risk that the discharged load may be transferred to adjacent areas where it can cause detrimental environmental effects shall be taken into account

The following element shall be taken into consideration when identifying less sensitive areas:

Open bays, estuaries and other coastal waters with a good water exchange and not subject to eutrophication or oxygen depletion or which are considered unlikely to become eutrophic or to develop oxygen depletion due to the discharge of urban waste water.

INDUSTRIAL SECTORS

1. Milk-processing
2. Manufacture of fruit and vegetable products
3. Manufacture and bottling of soft drinks
4. Potato-processing
5. Meat industry
6. Breweries
7. Production of alcohol and alcoholic beverages
8. Manufacture of animal feed from plant products
9. Manufacture of gelatin and of glue from hides, skin and bones
10. Malt-houses
11. Fish-processing industry

ANNEX 5

POSSIBLE RIVER CLASSIFICATION CRITERIA

Annex 5

Possible river classification criteria

All over the world different river classification systems where uses systematical river water classification goes back to the early 19th (Kolkwitz and Mursson 1902).

For the systematic catalogization and classification of rivers, depending on their water quality, a categorization of rivers in four zones is common and proofed :

These zones are :

- Polysaprobic Zone which is characterized by the absence of oxygen and a biochemical reduction process of organic matter.
This self cleaning process of river waters will lead to the
- Alpha Mesosaprobic Zone in which the reduction process diminishes and the
- Beta Mesosaprobic Zone in which the dissolves oxygen levels in the water increase. These Mesosaprobic Zones are followed by the
- Oligo Saprobic Zone which is characterized by the full oxidation and mineralization of organic pollutants.

Depending on the quality of the rivers and the situation concerning the execution of reliable and suitable analysis and measurements the four classifications can be completed by three additional classes, characterizing interim zones between the main four classes.

The classification system can be based on physical and chemical parameters as well as on microbiological parameters.

As river classification systems based only on chemical parameters can deliver different values resulting from the different dilution of the pollutants, it is highly recommended by the Expert to use a system which is easy to handle. Such a system was developed by the working committee of the German states on water resources (LAWA).

In the following, the basic principles and characteristics prepared by the working committee of the German states on water resources (LAWA) for assessing the quality of flowing waters are presented. It is highly recommended by the Consultant to use the same standardized measurements and presentation methods in the Republic of the Lebanon.

Biological determination of the depictions of the status of the flowing waters takes as its basis the principle of the saprobic system.

In order to permit application of a quality classification system the definition of the quality classes have to be limited to generally recognizable features with characteristics as specific as possible for quality classification. In the description of the quality classes, characteristic organisms or combinations of organisms particularly characteristic of them are listed. But it is also possible to determine the corresponding quality class in more detail by noting the saprobic

stage or the saprobic index on the basis of a detailed list of species which can be found at the end of this chapter.

When describing the quality classes, as characteristic indicators only biochemical oxygen demands after two and five days (BOD_2 , BOD_5), the ammonium content (NH_4 nitrogen) as well as the oxygen contents (O_2) are named.

The attempt to represent the complex subject of surface water pollution in a seven-class quality system must by the nature of things make compromises, and omit many of the natural features. For example, watercourses in hilly country react with regard to the oxygen balance differently from corresponding watercourses with the same organic pollution levels in flat terrain.

A further problem is the evaluation of toxic constituents, which result to a greater or lesser degree in a reduction of populations in surface waters and inhibition of their self-cleaning action. Although these effects are not directly equivalent to heavy pollution of the water with organic substances, surface waters massively polluted with toxic substances are assigned to the quality classes III - IV or IV, as such a watercourse section must be considered as very heavily or excessively polluted. The influence of salt-containing effluents - where this does not result in a substantial impoverishment of the organisms in the water - is, however, equally difficult to incorporate in this representation of water quality, as is also the content of toxic trace elements or organic compounds which break down only with difficulty in the water.

The biological investigations of flowing waters are undertaken at representative sampling locations, comparable in their hydrological characteristics, at times when, as far as possible, water levels are not high. In doing so, all micro-biotopes (stones, sludge deposits, inventories of aquatic plants) characteristic for the watercourse section investigated will be examined. For assessment purposes, the macro- and micro-organisms which are fixed in their position or bound to the substrate are included in the appraisal. Additionally, chemical and physical measurements may be used in order to support the biological finding.

When compiling the *characteristics for assessment of quality classes* of flowing waters, no mention is made of individual species, although their presence could also permit classification of the surface water, but whose determination requires a more specialized knowledge.

Quality class I:

Unpolluted to very slightly polluted (colour: blue).

Belonging to this quality class are in general headwater areas and upper river courses with very low pollution of flowing waters which stay cold in summer. This water is clear and poor in nutrients, its bed is usually stony, gravely or sandy, and where mud is encountered, it is mineral in its nature. It provides spawning waters for salmonides.

Moderately dense population, particularly by red algae (*Batrachospermum*), biotoms (*Meridion*, *Diatoma hiemale*, *Achnanthes minutissima*), mosses, flat worms, stone fly larvae, caddis worms and beetles.

The saprobic index is below 1.5

The O₂ content is close to saturation value (approx. 95 - 105% of the saturation level) and not below 8 mg/l. The BOD₅ is usually around 1.0 mg/l. NH₄ nitrogen is present at the most in trace amounts.

Quality class I - II:

Slightly polluted (colour: light blue).

Belonging to this class are slightly polluted flowing waters, mostly the upper courses of rivers. The water is still clear, and the nutrient content low. This water provides a habitat for salmonides with the characteristic fish being the bullhead (*Cottus gobio*).

Densely populated particular by algae (*Ulothrix*), mosses, flowering plants (*Berula*, *Callitriche*), flat worms, stone fly larvae, may fly larvae and caddis worms as well as beetles (*Elminthidae*, *Hydraenidae*).

The saprobic index lies between 1.5 and 1.8.

The O₂ content is still high (over 8 mg/l as a rule), but often already exhibits a discernible deficit (O₂ content approximately 85 - 95% of saturation level). As a rule, the BOD₅ is between 1.0 and 2.0 mg/l. NH₄ nitrogen occurs only at low concentration (0.1 mg/l on average).

Quality class II:

Moderately polluted (colour: green).

Belonging to this class are watercourse stretches which are moderately polluted by organic substances and their breakdown products. At times of strong algae development, the turbidity is marked. The watercourse bed is stony, gravely, sandy or muddy; even if the bottoms of stones are blackened by the formation of iron sulfide, there is no development of foul sludge. This water provides a high yield of fish.

These waters are very densely populated with algae (all species), flowering plants (often continuous mats), snails, small crayfish and insects of all species together with their larvae.

The saprobic index lies between 1.8 and 2.3

As a consequence of pollution with waste water and algae growth, the O₂ content fluctuates greatly (deficiencies and oversaturation), but remains so high that there is no die-off of fishes, which means it always remains above 6 mg/l. The BOD₅ frequently amounts to 2 - 6 mg/l. NH₄ nitrogen attains rarely a concentration of over 0.3 mg/l.

Quality class II - III:

Critically polluted (colour: light green).

Due to its heavy pollution with organic substances, this water is always slightly turbid; locally foul sludge may be encountered. Usually these waters still have a high yield of fish, but excluding salmonides.

Densely populated with algae and flowering plants (Potamogeton, Nuphar), fungi, moss animalcules, small crayfish, snails, mussels, leeches and insect larvae (with the exception of stone flies). Mostly several species grow together in colonies. Sewage fungi can often be discerned with the naked eye, even if they do not yet develop in large masses. In these waters, the greatest species diversity of the celaetes occurs.

The saprobic index lies between 2.3 and 2.7.

The O₂ content often drops to half the saturation value. Frequently the BOD₂ is 2 - 5 mg/l and the BOD₅ 5 - 10 mg/l. Usually the NH₄ nitrogen value is below 1 mg/l.

Quality class III:

Heavily polluted (colour: yellow).

The water is turbid due to discharges of waste water. The stony-sandy bed is usually blackened by iron sulfide. Where the current is slow, foul sludge is deposited. Low fish yields; periodic die-off of fishes is to be expected due to oxygen deficiency.

The population of macroscopic fauna shows little species diversity, but mass development of individual species occurs (water hog lice, leeches, fungi). Particularly noticeable are continuous colonies of sessile ciliates (Carchesium, Vorticella) and sewage bacteria (Sphaerotilus); in contrast, there is a steep decline in algae and flowering plants.

The saprobic index lies between 2.7 and 3.2.

O₂ is still always present, but drops at times to a value of around 2 mg/l. Frequently the BOD₂ amounts to 4 - 7 mg/l and the BOD₅ 7 - 13 mg/l. NH₄ nitrogen is usually over 0.5 mg/l and not seldom attains a value of a few milligram per liter.

Quality class III - IV:

Very heavily polluted (colour: orange).

The water is turbid due to waste water discharges and the watercourse bed mostly covered in mud (foul sludge). Fish are encountered only locally, and then not permanently.

The population consists almost exclusively of microorganisms, particularly ciliates, flagellates and bacteria. Of the macroorganisms, only red bloodworms and sludge worms are present, but these often on a massive scale.

The saprobic index lies between 3.2 and 3.5.

The O₂ content is sometimes below 1 mg/l, and as a rule attains only a few milligram per liter. Frequently the BOD₂ amounts to 5 - 10 mg/l and the BOD₅ 10 - 20 mg/l. NH₄ nitrogen is usually present in amounts of several milligrams per liter.

Also toxic influences can be the cause of a grave lack of species diversity of the biocenoses, even if otherwise the chemical findings are favourable.

Quality class IV:

Excessively polluted (colour: red).

The water shows a very high turbidity due to waste water discharges and the watercourse bed is usually characterized by thick deposits of foul sludge. In many cases, the watercourse smells of hydrogen sulfide. There are no fish.

These waters are populated almost exclusively with bacteria, fungi and flagellates; ciliates occur only in the form of a few free-moving species, but then often at a massive level.

The saprobic index lies above 3.5.

These watercourse stretches have been so heavily polluted by the discharge of organic waste waters that the O₂ content in the water exhibits very low concentrations, or there is none at all. Putrefaction processes predominate. The BOD₂ is usually above 8 mg/l and the BOD₅ over 15 mg/l. NH₄ nitrogen usually amounts to several milligram per liter. With a heavy pollution of toxic substances, biological dystrophication may occur.

As mentioned above for a more detailed classification commonly the saprobic index will be used. This criteria is based on microbiological analysis evaluating and defining type and species of the microorganismen. Each identified microorganism is combined with

- a saprobic value (s), characterizing the zone, for which the organism is representative
- an indication weight (g), characterizing the quality of the species and the capability working as an indication or leading species for one special zone

Depending on the quantity of this special species another multiplikator characterizing the abundance (h) will be multiplied with the saprobic value and the indication weight.

By working this way for each of the identified microorganism, the saprobic index (SI) is defined as the sum of each of the multiplations as follows:

$$SI = \sum s_i \cdot g_i \cdot h_i$$

A list of typical organism, commonly used for the determination of the saprobic index is attached to.

Name	Nr.	h	s	g
Perla sp.	336			
Physa acuta	1032		3,0	2
Physa fontinalis	1083		2,0	2
Planariatorva	1010		2,1	2
Planorbidae	1078			
Plectrocnemia sp.	372			
Polycelisfelina	1016		1,0	5
Polycelis sp.				
Polycentropidae	368			
Potamanthus luteus	25		2,3	3
Potamogeton pectinatus	2001		2,6	3
Potamogeton crispus	2002		1,8	4
Protonemura sp.	111			
Radix peregra	1006		2,0	2
Ranunculus fluitans	2003			
Rheotanytarsus sp.	43			
Rhyacöphila sp.	11			
Sericöstoma sp.	36			
Sialis sp.	46			
Simuliidae	13			
Sphaeriumcomeum	1012		2,4	3
Sphaerotilus natans	8018		3,6	3
Spongillidae				
Tubificidae	1013		3,8	4
Chironomiden				
Ephemeropteren				
Plecopteren				
Trichopteren				
Schwefelbakterien				
peritriche Ciliaten				
Blualgen				
Kieselalgen				
fädi e Grünalgen				

Name	Nr.	h	s	g
Achnanthes sp.	6160			
Achnanthes lanceolata	6090		1,2	4
Amphora ovalis	6044		1,8	2
Anthophysa vegetans	4000		3,2	4
Aspidisca costata	3035		2,8	4
Aspidisca lynceus	3026		2,9	5
Beggiatoa alba	8009		3,9	5
Beggiatoaleptomitiformis	8010		4,0	5
Bodo sp.	4034			
Carchesium polypinum	3000		2,9	3
Ceratoneis arcus	6077		1,0	5
Chantransia-Stadien	7095			
Chilodonella cucullulus	3001		2,9	5
Chilodonella uncinata	3022		3,0	5
Chlamydomonas sp.	7021			
Chromatium okenii	9049		3,9	5
Cinetochilum margaritaceum	3019		2,8	1
Cladophora sp.	7000		1,8	2
Cocconeis pediculus	6020		1,8	3
Cohnilembuspusillus	3129		3,4	3
Coleps hirtus	3049		2,5	3
Colpidium campylum	3011		3,9	5
Colpidium colpoda	3010		3,7	4
Cyclidium sp.	3005			
Cyclidium citrullus	3128		3,0	5
Cyclidium glaucoma	3127		3,1	5
Cyclotella sp.	6146			
Cymatopleura solea	6031		2,3	2
Cymbella sp.	6157			
Cymbella ventricosa	6004		1,5	3
Diatorna vulgare	6006		1,9	2
Diplophrys archeri	4035		2,4	3
Epistylis sp.	3055			
Euglena sp.	7016			
Euglena viridis	7006		3,4	2
Euplotes affinis	3037		2,4	3
Euplotes patella	3038		2,2	4
Fragilaria sp.	6161			
Glaucoma scintillans	3012		3,8	4
Gomphonema sp.	6090			
Gomphonema olivaceum	6019		1,9	2
Gyrodinium sp.	6083			
Hemiophrys sp.	3064			
Holosticha sp.	3008			
Litonotus sp.	3071			
Litonotus cygnus	3072		2,0	5

Name	Nr.	h	s	g
Litonotus fasciola	3023		3,0	4
Litonotus lamella	3039		2,2	4
Melosira varians	6005		1,9	2
Meridion circulara	6026		1,1	5
Microspora sp.	7093			
Mougeotia sp.	7089			

Name	Nr.	h	s	g
Navicula sp.	6162			
Navicula accommoda	6018		2,9	5
Navicula avenacea	6017		2,0	2
Navicula gracilis	6000		1,7	2
Navicula gregaria	6015		2,2	3
Nemätödes	5008			
Nitzschia sp.	6163			
Nitzschia acicularis	6023		2,7	4
Nitzschia linearis	6024		1,5	3
Nitzschia sigmoidea	6027		2,0	4
Oedogonium sp.	7052			
Opercularia sp.	3085			
Opercularia coarctata	3041		3,6	3
Oscillatoria sp.	8011			
Oxytricha sp.	3090			
Paramecium bursaria	3093		2,3	4
Paramecium caudatum	3002		3,3	4
Paramecium trichium	3003		3,8	4
Phormidium autumnale	8037		2,0	2
Pinnularia sp.	6151			
Rhoicosphenia curvata	6007		1,9	2
Sarcina paludosa	8038		4,0	5
Sphaerotilus natans	8018		3,6	3
Spirillum sp.	8017		4,0	5
Spirochaeta sp.	8003			
Spirostomum ambiguum	3131		3,0	5
Spirostomum teres	3014		3,0	4
Stentor coeruleus	3033		2,8	4
Stentor sp.	3137			
Stylonychia mytilus	3031		2,9	5
Surirella angustata	6133		2,2	3
Surirella ovata	6016		1,9	2
Synedra ulna	6003		2,0	2
Tachysomapeleionella	3134		3,0	1
Tetrahymena pyriformis	3013		4,0	5
Thiotrix nivea	8040		4,0	5
Trochilia minuta	3017		2,9	5
Ulothrix sp.	7015			
Uronema marinum	3130		3,3	4
Vaucheria sp.	7002			
Vorticella sp.	3116			
Vorticella campanula	3009		2,2	3
Vonicella convallaria	3004		2,9	5
Vorticella microstoma	3030		4,0	5
Vonicella striata	3132		2,7	1
Zoogloea ramigera	8028		3,9	5

المكتب الوزيري للدولة للشؤون التعليمية الإدارية
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 مركز مشاريع ودراسات القطاع العام

Table 5.1: Quality breakdown of flowing watercourses in accordance with LAWA

Quality class	Degree of organic pollution	Saprobic stage	Saprobic index	Chemical parameters*		
				BOD ₅ (mg/l)	NH ₄ - N	minimum O ₂ mg/l
I	unpolluted to very slightly polluted	Oligosaprobic organisms	1.0 - < 1.5	1	at the most traces	> 8
I - II	slightly polluted	Oligosaprobic organisms with betamesosaprobic tendency	1.5 - < 1.8	1 - 2	around 0.1	> 8
II	moderately polluted	well-balanced betamesosaprobic organisms	1.8 - < 2.3	2 - 6	< 0.3	> 6
II - III	critically polluted	alpha-betamesosaprobic boundary zone	2.3 - < 2.7	5 - 10	< 1	> 4
III	heavily polluted	distinctive alpha-mesosaprobic organisms	2.7 - < 3.2	7 - 13	0.5 to several mg/l	> 2
III - IV	very heavily polluted	polysaprobic organisms with alpha-mesosaprobic elements	3.2 - < 3.5	10 - 20	several mg/l	< 2
IV	excessively polluted	polysaprobic organisms	3.5 - < 4.0	> 15	several mg/l	< 2

* The chemical data merely provide indicative values for frequently encountered concentrations.

The relationship between saprobic quality, saprobic index and chemical parameters is shown in Table 5.-1: